NAWAB SALAR JUNG BAHADUR.

BOTANY.

CELLULAR CRYPTOGAMS— 1. FUNGUS. 2. SEAWEED. 3. MOSS.

VASCULAR CRYPTOGAMS— 4. HORSE-TAIL 5. CLUB-MOSS. 6. FERN.

7. GYMNOSPERMS (LARCH). 8. MONOCOTYLEDONS (IRIS). 9 APETALOUS DICOTYLEDONS (OAK)

10. GAMOPETALOUS DICOTYLEDONS (CONVOLVULUS). 11. POLYPETALOUS DICOTYLEDONS (BUTTERCUP).

CASSELL'S

ENCYCLOPÆDIA

OF GENERAL INFORMATION

NAWAB [illegible] BAHADUR.

WITH COLOURED PLATES AND MAPS
AND NUMEROUS FULL-PAGE ENGRAVINGS

BEAST—CASTRO

SPECIAL EDITION

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Beast-fable, -TALE, -STORY, or -SAGA, a name for any story in which the lower animals are represented as endowed with reason and speech. Such stories must have originated at a very early period in the development of the human race, when man saw nothing incongruous in attributing "discourse of reason" to the beasts of the field and to the objects of the chase. By observations and experience primitive man knew that the birds he snared and the beasts he shot possessed vital energy similar to that which animated him and his fellows, and that the flint-headed arrow which pierced and killed the enemy of his tribe dealt a similar fate to them. And since these lower animals lived a similar life to man, like him perished from hunger or were slain by violence, and also like him were seen in dreams, and therefore possessed some kind of soul, what more natural than to conclude that they shared his higher nature, and possessed faculties similar in kind if not in degree? Through this stage every race has passed in its progress from savagery to civilisation, and through it every child passes in the present day, though in the vast majority of cases the remembrance of such a stage is lost long before full mental vigour is reached. Most persons have seen a child playing with a cat or a dog, talking to it gravely, and positively puzzled by the fact that the beast did not obey the commands laid upon it, or reply to the questions put to it. Few, however, stay to ponder on such incidents; nevertheless, in the mental condition that renders such incidents possible is to be found the reason for the genesis and continued existence of the Beast-fable.

From the foregoing it will be seen that it is impossible to fix the origin in time or space of this form of literature, since it is, so to speak, the common property of races or individuals in a certain mental condition. Wherever any race is in this mental condition the Beast-fable pure and simple flourishes; when the race advances mentally the Beast-fable is gradually transformed into an apologue and fitted with a "moral," as in Æsop's fables. Sometimes it passes through a third stage and is spiritualised. The mendicant friars did this with such stories in the Middle Ages, and specimens may be seen in the *Gesta Romanorum*. As a sample of the first kind the following African story is abridged from Tylor:—"The great Engena-monkey offered his daughter to be the bride of the champion who should drink a whole barrel of rum. The elephant, the leopard, and the boar tasted the spirit, and retreated. Then the tiny Telenga-monkey, who had hidden thousands of his fellows in the long grass, came and took his first sip, and went away, sending another and another in his stead till the barrel was emptied, and then he walked off with the king's daughter. But the elephant and the leopard attacked him, and he took refuge in the top of the trees, vowing never more to live on the ground and suffer such violence and injustice."

Traces of these stories may be found in the Scriptures. Two of the things which were "too wonderful" for Solomon—"the way of an eagle in the air, the way of a serpent upon a rock," apparently refer to stories which have not come down to us, though they may not improbably be connected with a legend about an eagle and a snake preserved in the cuneiform inscriptions of Assur-bani-pal's library. In Eccles. xi. 20 there is an allusion to the belief that some birds possess the power of speech —"a bird of the air shall carry the voice, and that which hath wings shall tell the matter." This constantly appears in Oriental tales, and we ourselves still use the expression, "A little bird told me." But there are far more weighty examples to be quoted. In the 148th Psalm "beasts and all cattle, creeping things, and flying fowl" are invoked to "praise the Lord;" and in the *Benedicite*—which forms part of the liturgy of the Anglican and Roman Churches—the "whales and all that move in the waters," the "fowls of the air," and "beasts and cattle," are called on to "bless the Lord," and to "praise and exalt Him above all for ever." These last two instances suggest the thought that possibly primitive man may have "builded better than he knew" when he ascribed community of nature to man and the lower animals, especially when one remembers that he has so nearly anticipated the would-be conclusions of certain advanced evolutionists, and that Bishop Westcott in his *Essays in the History of Religious Thought in the West* summarises with what a reviewer calls "indirect recommendation" the teaching of Origen as to the pre-existence of souls. [TRANSMIGRATION.]

Beat, in *Music*. (A) The name given to a peculiar *turn* employed in old music. (B) An acoustical

phenomenon due to the interference of sound waves. If two notes of very nearly the same pitch be sounded together, the effect produced will be that of a single throbbing note with rapid periodic variation in intensity. It may often be observed in the clang of bells. The number of throbs, or *beats*, is equal to the difference in the frequencies of the two notes. Thus if one note is produced by 256 vibrations per second and another by 258, when the two are sounded together two beats per second will be heard. A similar effect is produced when the frequencies, instead of being nearly equal, are very nearly in some simple ratio to each other. This effect supplies a method for the estimation of the frequency of a note. [FREQUENCY, INTERFERENCE.] (C) The movement of the hand or bâton in counting time. (D) Also the several divisions of the notes in a bar of music, according to the time-sign indicated.

Beatification, in the Roman Catholic Church, a kind of preliminary and inferior kind of CANONISATION (q.v.), by which, not less than fifty years after death, the person beatified receives the title of Beatus or Blessed, and is formally established as an object of worship to a particular order or district, but not (as when canonised) to the whole Roman Catholic world. (Canonisation of course does not necessarily follow.)

Beaton, DAVID, Archbishop of St. Andrews and Cardinal, was born in 1494, educated at St. Andrews and Glasgow, and also studied at Paris. Through the patronage of his uncle, James Beaton, his preferment in the Church was rapid, and in 1524 he sat in the Scottish Parliament as Abbot of Arbroath. In 1528 he was appointed by King James V. Keeper of the Privy Seal, and went on various royal missions to the French court, where he was held in high esteem. Pope Paul III. made him a cardinal in 1538, and in 1539 he succeeded his uncle in the see of St. Andrews. On the death of King James, 1542, he endeavoured to become one of the regents of the kingdom during the minority of the infant Queen Mary; but his claims, which were based on a forged will of the late king, were set aside, and the cardinal himself imprisoned. In 1543 he crowned Queen Mary at Stirling, and was appointed Chancellor of Scotland. He now became notorious for his zeal in persecuting the Protestants. Amongst others he sent the famous preacher, George Wishart, to the stake, viewing the martyr's sufferings from a window with exultation. At length a plot to assassinate him was formed, and on May 29th, 1546, he was murdered at St. Andrews in his own castle.

Beaton, JAMES, Archbishop of Glasgow and St. Andrews, took his degree at the University of the latter in 1493. He received his first ecclesiastical appointment in 1493, thereafter rapidly rising until he became Archbishop of Glasgow in 1509, and of St. Andrews in 1522. He also held the offices of lord treasurer and chancellor, and during the minority of James V. was a leading figure in Scottish history. He was one of the regents, and strongly in favour of the French as against the English alliance. He held direct communication with France through his nephew, David Beaton (q.v.), who represented Scotland at the French court, and who favoured his uncle's policy. He sent the leaders of the Reformed doctrines to the stake, as his nephew did after him. He died in 1539.

Beatrix Antelope. [ORYX.]

Beattie, JAMES, poet and writer on philosophy, was born at Laurencekirk, October 25th, 1735. After graduating at Marischal College, Aberdeen, he became schoolmaster successively at Fordoun and the Aberdeen grammar school, becoming in 1760 Professor of Moral Philosophy in Marischal College. In 1770, after one or two volumes of poems, appeared his celebrated *Essay on Truth*, which acquired the reputation of having overthrown Hume's scepticism, and led to the offer of many honours. He is chiefly remembered now, however, as the author of *The Minstrel*, the first part of which appeared in 1771, and the second in 1774. After publishing several volumes of essays and dissertations of a religious and philosophical nature, he died at Aberdeen, August 18th, 1803.

Beattie, WILLIAM, physician, was born in Dumfriesshire in 1793. As physician to the Duke of Clarence, afterwards William IV., he travelled with him on the Continent and published the results in several books on Switzerland, North Italy, and the Danube. In 1849 he published the *Life and Letters* of his friend, Campbell, the poet. He also wrote treatises on *Consumption* and the *Home Climates*, and a poem, *Heliotrope, or the Pilgrim in pursuit of Health*. He died in 1875.

Beaucaire (derived from *Bellum Quadrum*, the beautiful square), is a French commercial town on the Rhone, and in the department of Gard; a magnificent suspension bridge of four spans and 1,456 feet long connects it with Tarascon, which is on the opposite (the left) bank of the river. Beaucaire is chiefly celebrated for its great fair (July 21–28), which dates from the year 1217. To it come merchants from all parts of Europe, and even from parts of Asia.

Beauce, a French district, part of the old Orléannois, and now in the departments of Loir-et-Cher and Eure-et-Loir. It is very productive in farm produce and wine.

Beauchamp, ALPHONSE DE, historian and littérateur, was born at Monaco in 1767, dying in Paris in 1832. In 1784 he entered the Sardinian military service, and was imprisoned for refusing, from conscientious motives, to fight against the French Republic. On his release he went to Paris and obtained government employment, having the press under his surveillance. He displeased the authorities with his *Histoire de la Vendée et des Chouans*, and lost his situation, being obliged to leave Paris. In 1811 he was allowed to return, and received a small pension, which was continued to his widow. His best known historical and

biographical works are:—*Histoire de la Conquête du Pérou*, 1807; *Histoire du Brésil*, 1815; *Histoire de la Revolution du Piémont*, 1823; *Vie de Louis XVIII.*, 1821. The *Mémoires de Fouché* are also attributed to him.

Beauclerk, TOPHAM, son of Lord Sydney Beauclerk, was born in 1739, succeeding in 1744 to the estates that his father had inherited from Richard Topham. In 1768 he married Lady Diana Spencer, eldest daughter of the second Duke of Marlborough, two days after her divorce from Lord St. John and Bolingbroke. He died in 1780, leaving a library of 30,000 volumes, a catalogue of which is in the British Museum. He was a particular friend of Dr. Johnson, and is portrayed in Boswell's pages.

Beaufort, a French town in the department of Maine-et-Loire, 16 miles E. of Angers. It has manufactures of canvas and coarse linen and a college. There is another French town of the name in Savoy, doing an extensive trade in Gruyère cheeses.

Beaufort, HENRY, Cardinal, was a natural son of John of Gaunt, and half-brother of Henry IV. of England. He was born in 1377 and died in 1447. After being Bishop of Lincoln, he was transferred to Winchester in 1404. He occupied the office of Lord Chancellor on different occasions, and was an active participator in the political movements of his time.

Beaufort, SIR FRANCIS, naval officer and hydrographer, was born in 1774, and entered the Royal Navy in 1787. He served in the *Aquilon* on the Glorious First of June, 1794, and in the *Phaeton* on the occasion of Cornwallis's celebrated retreat. Becoming a lieutenant in 1796, he was severely wounded in 1800 while assisting in the cutting out of a Spanish vessel, moored under the guns of a battery. Immediately afterwards he was promoted to the rank of commander, and in 1810 he attained post-rank. Thenceforward he was for some time employed on surveying duty, and in 1832 was appointed hydrographer to the Admiralty, a post which he held until 1855. He was made an F.R.S. in 1814, rear-admiral in 1846, and K.C.B. in 1848. He died in 1857.

Beaufort Arm, an artificial limb consisting of a wooden hand and a leather arm. It was distributed to the maimed soldiers of the French army in 1871.

Beaugency, an old town in the department of Loiret, France, about 14 miles S.W. of Orleans, on the right bank of the Loire, having a station on the railway to Tours. The château was formerly the seat of the lords of Beaugency, whose domain was absorbed by the Crown in the 13th century. There is a ruin known as Cæsar's Tower. Joan of Arc took the town from the English in 1429. It enjoys a considerable trade in corn, wine, and agricultural produce.

Beauharnais, JOSEPHINE MARIE ROSE DE, was born in Martinique in 1763, her family name being Tascher de la Pagerie. At the age of 15 she married Vicomte Alexandre de Beauharnais, who joined the revolutionary movement, served as a general of division in the army of the Rhine (1792), was accused of treason and beheaded in 1794. By this marriage she had two children, Eugène (q.v.) and Hortense, the wife of Louis Bonaparte, King of Holland. She nearly shared her husband's fate, but Tallien, charmed by her beauty and manner, saved her. She next exercised her influence on Barras, and in 1796 in an interview with Napoleon so captivated the great conqueror that he married her. She filled her high position with grace and brilliancy, but unhappily no children were born of this union, and Napoleon, though as deeply attached to her as his nature permitted, for dynastic considerations procured a divorce in 1809. Josephine bore this cruel parting bravely, but it broke her heart. She lived in retirement at Malmaison until after Napoleon's banishment to Elba, and died in 1814.

Beauharnais, EUGÈNE DE, the son of the foregoing, was born in 1781. In 1795 he went to General Bonaparte to claim his father's sword, and his bearing attracted the future emperor, who next year became his step-father, and took him as aide-de-camp to the Italian campaign. The lad accompanied his protector to Egypt, where he showed great courage, and played a brilliant part in the second Italian war. He rose rapidly, and in 1804, being then colonel-in-chief of chasseurs, was created a prince of the empire. In 1805 he acted as viceroy in Italy, and filled the post with tact and intelligence. Next year he married Augusta Amelia, daughter of the King of Bavaria, and was adopted by Napoleon as his successor. In 1809 he foiled with much skill the attempt of Austria to recover her hold on Italy, and followed up his successes at Raab and Wagram. The jealousy of the Bonaparte family now began to undermine the influence of Josephine and her son. Eugène gave his assent to the divorce, and served Napoleon with zeal in the disastrous invasion of Russia, and in the subsequent operations in north Italy. After the battle of Bellegarde he fought no more. In 1814 he was deprived of his viceroyalty, but was allowed by Louis XVIII. to retain his title of prince. He preserved a quiescent attitude during the Hundred Days, and retiring to Munich received the principality of Eichstadt and the dukedom of Leuchtenburg. He died of apoplexy in 1824. Of his six children the eldest married Donna Maria, Queen of Portugal, and died early; Josephine became the wife of Oscar Bernadotte, Crown Prince of Sweden; and Amelia was the consort of Pedro, the Emperor of Brazil.

Beaujolais, a district of France, now comprised in the departments of Rhône and Loire, having Beaujeu for its chief town. In the 9th century it was a barony in the hands of the Counts of the Lyonnais and Forez. About 1400 it passed to the Bourbons, and Anne of France, daughter of Louis XI., was known as La Dame de Beaujeu. In 1626, by the marriage of Marie de Montpensier with Gaston

d'Orléans, it was acquired by the House of Orleans, who retained it till 1808. Its name is still preserved to designate the excellent wine for which it has long been famous.

Beaumarchais, PIERRE AUGUSTIN CARON DE, the son of a watchmaker named Caron, was born at Paris in 1732. Though devoted to music he stuck to his father's trade, and an ingenious invention which he had to protect by an appeal to law, brought him to the notice of Louis XV., who first appointed him court watchmaker, and then comptroller of the household. He next gave lessons in music to the three princesses. Allying himself with Paris Duverney, the notorious speculator, he grew rich and was ennobled by the king. In 1764 he went to Madrid, where he picked up materials for his *Figaro*, and by his adventures with Clavigo provided Goethe with the theme for a drama. A protracted lawsuit led to the publication of his *factums*, or statements of case, full of argument, wit, and satire, that conduced not a little to the spread of revolutionary ideas. About the same time he produced several of his plays, the *Barbier de Séville* appearing in 1775. He acted in London as the secret agent of France to foment the outbreak of the American colonies, and as a speculation sent out cargoes of arms and ammunition, for which he did not get paid. In 1784 his masterpiece, *Le Mariage de Figaro*, was brought out under some difficulties and won him enormous credit. He threw himself with some ardour into the revolution, but during the Reign of Terror was imprisoned and narrowly escaped the guillotine. After some years of poverty he died suddenly in 1799.

Beaumaris, the chief town and municipal borough of the Isle of Anglesey, North Wales, situated three miles from Bangor, on a fine bay at the entrance of the Menai Straits. There is an old castle built by Edward I., and a handsome church. Until 1885 it sent a member to Parliament, but the representation is now merged in a division of the county. Little trade is carried on, and the influx of visitors during the bathing season is the principal source of prosperity. Pop (1901) 2,310.

Beaumaris Shark. [PORBEAGLE.]

Beaumont, FRANCIS, the son of a judge of the Court of Common Pleas, was born in 1584, and educated at Oxford. Nominally a member of the bar he took little interest in the profession, but sought the society of Ben Jonson, and the wits of the day, attaching himself most closely to John Fletcher, nine or ten years his senior, so that their two names are indissolubly bound together in the history of the English drama. Over fifty dramas and poems are attributed to their joint labours, but it has never been satisfactorily decided what share in the composition is to be assigned to each partner, the allocation of thirty-eight to their united efforts and eighteen to Fletcher alone being quite fanciful. Beaumont is generally credited with having the advantage in tragic and pathetic power, in the higher ranges of feeling and expression, and in the more solid elements of comedy; whilst to Fletcher are attributed brilliancy, fluency, quickness of invention, romanticism, levity, and graceful ease rather than strength. *Philaster*, produced in 1607, is believed to be the first of their joint works, and before Beaumont's death *The Maid's Tragedy*, *King and No King*, *Bonduca*, and *The Laws of Candy* appeared on the tragic stage, with the comedies entitled *The Woman Hater*, *The Knight of the Burning Pestle*, *The Honest Man's Fortune*, *The Coxcomb*, and *The Captain*. Of the three tragedies and nine comedies brought out by Fletcher after his colleague's death none possesses features that distinguish it from the earlier pieces. *The Faithful Shepherdess*, often regarded as his individual creation, reveals the qualities usually connected with the name of Beaumont. The feebler hand that cooperated with Shakespeare in the *The Two Noble Kinsmen* may perhaps have been Fletcher's, but Beaumont is linked with him on the title page of the first edition. The poetic pair seem to have lived together on strictly communistic principles until 1613, when Beaumont married. Three years later he died and was buried in Westminster Abbey. Fletcher, the son of a cleric, who from the living of Rye was promoted to the bishoprics of Bristol and of Worcester, was born in 1576. His father's death apparently left him in great straits, but he went to Cambridge, and had found a place among the frequenters of the *Mermaid* tavern when he fell in with Beaumont, whom he survived nearly ten years, dying of the plague in 1625. Their compound genius never rivalled Shakespeare in either branch of the drama, and even fell somewhat short of Webster and Marlow in tragedy, and of Jonson in comedy. Their writings exhibit the defects of youth in the absence of strong and persistent moral purpose, and are often marred by a coarseness and laxity unworthy of the Elizabethan age.

Beaumont, JEAN BAPTISTE ÉLIE DE, was born in Calvados, France, in 1798, and educated at the École Polytechnique. He became in 1824 Professor of Geology in the School of Mines and afterwards in the College of France. Elected to the Academy of Sciences in 1825, he succeeded Arago as perpetual secretary to that body. His great work was the preparation, in concert with Dufresnoy, of the Geological Map of France, but many other minor undertakings attest his industry and intelligence. His theory as to the origin of volcanoes and the elevation of mountains has provoked much discussion, and gained but little credence outside France. He taught that the crust of the earth was upheaved by subterranean forces until at last the dome-like mass gave way at its highest point and the molten lava and other substances were ejected. He, moreover, applied his idea to the raising of mountain systems generally. He died in 1874.

Beaune, a town in the department of Côte d'Or, France, on the railway from Paris to Lyons, and 23 miles S.W. of Dijon. Though ancient it is well laid out and built, and contains two twelfth century churches as well as the Hospital of Nicolas

Rollin founded in 1443. The wine which bears its name is one of the best of the second-class Burgundies, and in the immediate neighbourhood are produced some of the finest growths of Burgundies. Besides enjoying a large trade in wine the town possesses cloth factories, distilleries, and dye works.

Beaune, JACQUES DE, Baron of Samblançay, born at Tours in 1445, became the superintendent of finances under Charles VIII., Louis XII., and Francis I. He lent to the queen-mother, Louise of Savoy, a sum of money destined for Lautrec, who was then endeavouring to relieve Milan, and whose expedition failed in consequence. Louise induced his secretary, Gentil, to steal the receipts, and Jacques being charged with embezzlement was convicted and hanged (1527). His innocence was afterwards proved, and Gentil was sent to the gallows.

Beauregard, PIERRE GUSTAVE TOUTANT, was born at New Orleans in 1818, and educated at West Point, entering the artillery of the United States in 1838, and after active service in Mexico being transferred to the engineers. In 1861 when the civil war broke out he was at the head of the West Point Academy. He adopted the Southern cause, commanded in the attack on Fort Sumter, and took part in the battle of Bull Run. In 1862 he fought at Shiloh under A. S. Johnston, and next year held Charleston against Gilmore. He was serving in North Carolina with E. S. Johnston when the latter surrendered in 1865. He then made his home in the south, and became president of the New Orleans, Jackson, and Mississippi Railway. Died 1893.

Beausobre, ISAAC DE, born at Niort in 1659, entered the Protestant ministry, and had to escape from France about the time of the revocation of the Edict of Nantes. He took refuge first in Holland, but in 1694 settled in Berlin, where he became chaplain to the king and councillor of the royal consistory. He was a man of sense and erudition. His *History of Manicheeism* was praised by Gibbon, and his *History of the Religious Reformation* is a fragment of a work conceived on a grand scale. He translated also the New Testament. His death occurred in 1738.

Beauvais (anc. *Cæsaromagus Bellovacorum*), the capital of the department of Oise, France, on the river Thérain, about 45 miles N. of Paris, with which it is connected by railway. It is a very ancient town, and contains a basilica of the sixth century, the noble cathedral of St. Peter, begun in 1225 and never finished, with admirably stained glass, the church of St. Étienne, also retaining fine windows, the episcopal palace, and the hôtel-de-ville. The tapestry of Beauvais has long been famous, and carpets, velvets, woollen and leather goods are made. There is a large trade in corn and wine. The heroism of the women headed by Jeanne Hachette during the siege by the Duke of Burgundy, in 1472, is commemorated by an annual fête.

Beauxite, or BAUXITE, is an earthy hydrous oxide of aluminium and iron ($3Al_2O_3 + Fe_2O_3 + 2Aq$), occurring in oolitic granules in limestone at Beaux, near Arles, in the south of France, and employed on a large scale in the manufacture of aluminium.

Beaver, the popular name of any individual of the genus Castor, which constitutes a family (Castoridæ) of the Sciuromorpha or Squirrel-shaped division of simple-toothed Rodents. [RODENTIA.] Authorities differ as to the number of species in the genus; some hold that there are two—*Castor fiber*, the European, and *C. canadensis*, the American Beaver; others are of opinion that the differences between the two forms "are sufficiently striking to justify us in regarding them as varieties of one and the same species;" and there are yet other systematists who believe that these differences are not sufficient to warrant the classing of the American Beaver even as a variety. With the exception of the Capybara (q.v.) the Beaver is the largest living rodent. An adult male is somewhat less than a foot in height; the head and body are about 30 in. long, and the tail, which is nearly oval and flattened horizontally, some 10 in. more. The body is stout and massive, the back arched, the head large, the neck short and thick, the muffle naked, ears and tail scaly, the former capable of being folded so as almost to close the passage to the internal ear, the eyes small and furnished with a nictitating membrane, and the nostrils can be closed at will. The general colour of the fur is reddish-brown on the upper surface, lighter and greyish below. The hue varies considerably in different individuals and becomes darker in high latitudes. Numerous instances of black, pied, and albino forms are recorded, and these are noted in some books as distinct varieties. The hind feet are webbed, and all the digits armed with claws; the second toe of the hind feet is usually furnished with a double claw, the supplementary one being under the other. On the right of the opening of the intestinal tube into the stomach there is a large glandular mass, and the anal and urethro-genital orifices open into a common passage. The skull is massive, and there is a distinct sagittal crest [SKULL] for the attachment of the strong muscles which move the lower jaw. There are four molars and one incisor on each side in each jaw, making twenty teeth in all. The incisors, which are of deep orange-red colour, spring from persistent pulps, and are admirably adapted for cutting instruments. Indeed, according to Sir John Richardson, the North American Indians used them to cut bone and to fashion their horn-tipped spears till the introduction of the English file gave the Red man a better tool. The molars are nearly similar in size and structure, but the first is the largest; in the upper molars there are three folds of the enamel on the outer, and one fold on the inner surface, and similar folds, but in reverse order, on the lower molars.

At one time the beaver was plentifully distributed over the northern parts of both hemispheres. Remains have been found in the Fens, and it is said that Beverley owes its name and arms to the fact that beavers once abounded in the neighbouring river. There is historical evidence that they were

formerly found in Wales and Scotland, though in the former they were confined to the river Teify in the twelfth century, but they appear to have lived on in Scotland for some 300 years longer. At present there is a protected colony in Bute, and there are some few individuals living under similar conditions in France and Germany. Though the beaver was once plentiful in Scandinavia, it is either extinct there or rapidly becoming so, and it is only in Poland and Russia that the animal can be found under natural conditions in Europe. In Asia it is fairly abundant in Siberia, and in the rivers which flow into the Caspian Sea. In North America, where the beaver formerly ranged over the whole continent from Labrador to North Mexico, it is still fairly abundant in the wilder portions of the western territories. Beavers are aquatic animals, and their dwellings are always close to, or in the neighbourhood of water. They are excellent swimmers, using only the hind feet for this purpose, the fore feet being employed, like hands, in carrying and building operations, and in conveying food to the mouth. [BIMANA.] They are mostly nocturnal, rarely venturing abroad by day, and live in families or colonies, in a common dwelling in the construction and maintenance of which all are expected to take part. Those animals which neglect to do so are driven away, and live solitarily in burrows of their own, and are generally known as "terriers," and sometimes from their sex, for they are always males, as "old bachelors." Beavers feed mainly on the bark of trees, supplementing this diet by the roots of the common water lily (*Nuphar lutea*); but when they journey inland, as they do in the warm season, they live on roots, fruit, and corn.

Beavers are excellent wood-cutters. "When the beaver cuts down a tree it gnaws it all round, cutting it, however, somewhat higher on the one side than the other, by which the direction of its fall is determined. The stump is conical, and of such a height as a beaver sitting on his hind-quarters could make. The largest tree I observed cut down by them was about the thickness of a man's thigh (that is six or seven inches in diameter), but Mr. Graham says he has seen them cut down a tree which was ten inches in diameter." (*Sir J. Richardson.*) Another writer, speaking of the destruction of trees by beavers, says, "the timber was entirely penetrated for a space of three acres on the front of the river, and one in depth, and great part of it removed, though some of the trees were as thick as the body of a man." In the enclosure appropriated to the beavers at the Zoological Gardens, Regent's Park, the visitor may see proof of the skill of these animals in felling trees with no other tools than their incisor teeth.

The beaver is hunted for its fur, which was formerly much used for making hats, and to a less extent for gloves. It is now chiefly employed for ladies' capes and for trimming. From the earliest times, too, these animals have been taken for the sake of the castoreum (q.v.), secreted by glands in the groin of the male. Wonderful tales have come down to us from Greek and Roman days, as to how, when hard pressed by the hunter, the animal would bite off these glands—then erroneously supposed to be sexual organs—and escape while his pursuer stopped to pick them up. Another version is to the effect that the beaver would lie placidly on his back when the hunter approached, that he might obtain what he wanted without trouble, and so be induced to spare the life of his victim. The flesh of the beaver is sometimes eaten, and is said to resemble pork in flavour; the tail is considered a luxury by trappers. In the scale of intelligence the beaver stands high, as is shown by its dwellings. The best authority on this subject is Mr. Lewis H. Morgan (*The American Beaver and his Works*). According to this writer the simplest form of beaver-dwelling is a burrow, differing little from that of other rodents except in the fact that it opens under the water. He supposes that a breach of such a burrow at the upper end, if repaired with sticks and earth, would suggest the beaver *lodge*—an oven-shaped building of sticks with grass interwoven and plastered with mud—though it must be borne in mind that the animal does *not* use his tail as a trowel—and repaired or added to when necessary. Of these lodges Mr. Lewis enumerates three kinds, which differ principally in the situations in which they are built—on small islands, in ponds or dams, on the banks of a lake or stream, or shelving shores with a large part of the dwelling built out into the water. But all beavers are not such accomplished builders; in some there would appear to have been degeneration in this respect, or the habit has never been developed. In Mr. Lewis's book will also be found interesting details as to beaver dams, by which these animals keep the water of variable streams up to the necessary height, and the canals by which they transport timber which they cannot roll. The beaver appears first in the Miocene of N. America, and is found in the Pleistocene of Europe. An allied form occurs in the Pliocene of the Auvergne. [TROGONTHERIUM.]

Beaver. Though the animal of this name sometimes occurs, the word in *Heraldry* nearly always is used to signify the beaver or visor of a helmet, which was that part protecting the sight and opening in the front, and capable of being raised or lowered at pleasure. Whether the beaver be open or closed, whether the helmet be in profile or affrontée, the metal it is made of and the number of "grills" displayed determine, with other marks, the rank belonging to the owner of the coat-of-arms which it surmounts. [HELMET.]

Beaver Rat (*Hydromys chrysogaster*), a rodent from the Australian region, about two feet long, of which the tail is one-half; neck and upper parts of the body rich dark brown, washed with a light golden tint as far as the hind limbs; under-surface golden-yellow; the basal half of the tail is black, the remaining part white. The hind feet are webbed. The name is sometimes applied to the Musquash (q.v.).

Bebek, or BABEC, a town in the province of Fars, Persia, on the Kirman frontier, 100 miles N.E. of Shiraz. Formerly a fine and prosperous city, it has now sunk into decay.

Bebek Bay, on the west side of the Bosphorus, is a pleasant resort five miles from Constantinople. The Sultan has a palace there, and the American School and French Lazarist College are among other public establishments.

Bebel, HEINRICH, born in Suabia about 1472, studied at the universities of Cracow and Basle, and in 1497 was appointed professor of literature at Tübingen. He was one of the best Latin scholars of the day, and his *Opuscula* show a great knowledge of the classics, but his poetical efforts lapsed into gross buffoonery. He died about 1516.

Beberia Sulphate, BEBERINE, BEBEERU BARK. The greenheart tree, *Nectandra Rodiæi*, contains an alkaloid beberine applied medicinally in the form of the sulphate Beberiæ sulphas. It was thought at one time that it would supersede quinine as an antiperiodic; it is, however, now but rarely heard of.

Bec, a small town in the department of Eure, France, famous for the Benedictine abbey founded there in 1077 by Herlouim. Many illustrious churchmen were trained in its walls, Lanfranc and Anselm among them. The cloister is now a stable.

Beccaria, CÆSAR BONESANA, MARQUIS OF, was born at Milan in 1735 or 1738. He devoted himself to the study of social and judicial reforms, and in 1764 published a little treatise on *Crimes and Punishments*, which was translated into every European language, and produced a striking effect on the ablest minds of the day. In conjunction with other young Italians he got up a periodical, *Il Caffe*, in the style of the *Spectator*, for the discussion of kindred topics. He was appointed to a chair of political economy at Milan in 1768, and later on was made a member of the Supreme Economic Council. He wrote nothing during the last twenty-five years of his life, but his lectures were printed posthumously. His cardinal doctrine asserted the injustice of any punishment that exceeds what is necessary for the preservation of the public safety. He pointed out the demoralising effects of sanguinary and cruel penalties, of judicial torture, of the use of spies, and of rewards for evidence. He advocated open trial by jury, and the restriction of the power of the judge. Though his bias towards utilitarianism and the theory of a social contract blinded him to the highest conception of moral duty, his teachings did much to bring about the beneficent changes witnessed by the eighteenth century. He died in 1794.

Becher, JOHANN JOACHIM, was born at Spires in 1635. He acquired a great knowledge of medicine, chemistry, and physics, and in 1666 became professor at Mayence. Thence he moved to Munich, and later on appeared at Vienna, where, under the patronage of Zinzendorf, he started several ambitious enterprises for trade and manufacture. Something was amiss in his character, for he had to fly from Vienna, and in 1678 he found himself at Haarlem, afterwards visiting England and Scotland. He is said to have died in London in 1682. His many works, though affected by the old quackery and superstition, show a decided progress towards scientific chemistry, leading up to the phlogistic theory of Stahl. He discovered boracic acid.

Bechuanaland, in South Africa, about 270,000 square miles in extent, inhabited by the Bechuana, Bechwana, or Betjuana nation. It extends from Griqualand West in a northerly direction to the Upper Zambesi, being bounded on the E by the Limpopo river and Matabeleland, and on the W. by Great Namaqua Land and Damara Land. In 1885, however, the portion of this great region S. of the Molopo river, amounting to 45,000 square miles, came under the British sphere of influence. In 1895 it was made a Crown colony, and is known as British Bechuanaland, whilst the sphere of British protection has been extended as far as lat. 22° S. This policy was rendered necessary by the aggressions of the Boers, who, in 1884, tried to establish the republics of Stellaland and Goshen on the territories of Montssioa and Mankaroane, the two native chiefs. Mr. John Mackenzie and Sir Charles Warren materially aided in organising the new colony, the capital of which is Mafeking. The soil is fairly fertile, but timber is deficient. For the rearing of cattle it is highly favourable. Gold and other metals have been found. The climate, owing to its elevation of about four thousand feet, is one of the best in Africa. Total population (1907), 134,000.

Bechuanas, a widespread South African Bantu race, whose domain extends from the Orange river north to the Zambesi, and from Namaqua and Damara lands east to the Orange Free State, Transvaal and Matabililand. This region comprises politically the British Crown colony of South Bechuanaland, 50,000 square miles, population 53,000, together with the British protectorates of North Bechuanaland, including Khama's Territory and Lake Ngamiland, 200,000 square miles, population about 500,000; total 250,000 square miles, population 550,000, exclusive of the Basutos, who are an eastern division of the same people. [BASUTOS.] The chief tribal divisions, some constituting important nationalities, and till recently powerful independent states, are: 1. *Baharutse* (*Barotse*), west of the Upper Limpopo, on northwest frontier Transvaal; 2. *Batlapi* ("Fish People") Griqualand West; 3. *Batlaro*, southernmost of all the Bechuanas, west frontier Griqualand, now mostly absorbed in the Batlapi group; 4. *Barolong*, between the Molopo river and the tributaries of the Kuruman; 5. *Bakatla*, Gamcohopa district; 6. *Bawanketsi*, Khanye district, Upper Limpopo basin; 7. *Bakwena*, north of the Bawanketsi territory; 8. *Bachwapeng*, the hilly district south of Shoshong; 9. *Basilika*, east of Shoshong near left bank Limpopo; 10. *Bakalahari* (*Balala*), the Bechuanas of the Kalahari desert; 11. *Bamangwato*, Khama's people, most powerful of all the Bechuanas, Ngamiland, capital, Shoshong; 12. *Makololo* of the Zambesi. [MAKOLOLO.] The

Bechuanas, chiefly sedentary shepherds and agriculturists, are amongst the most intelligent of all Bantu peoples, and Khama, chief of the Bamangwatos, has displayed remarkable qualities as a ruler and reformer of his people. The system of totemism is largely developed among the tribes, many of whom take their names from the object, generally an animal, which they regard as their tutelar deity, offering it a kind of worship expressed by the word *lino*, to dance. Thus the Bechuanas probably take their name from the Cape baboon (*chuene*) still the totem of the Barotse or elder branch; the Bakatlas revere the *katla*, another species of ape; the Bakwenas venerate the *kwena* (crocodile), and so on. The Bechuana language, which is spoken with considerable dialectic variety, presents greater affinity to the Zulu-Kafir than to any other Bantu idiom; about 50 per cent. of the words are absolutely identical, while most of the rest diverge according to fixed phonetic laws. It has been reduced to writing by the missionaries, who have been successful in evangelising several of the tribes. The first English mission of Littaku was founded before the year 1820, and French Protestant missionaries have worked in the same field since 1830. See Livingstone's *Missionary Travels* (1857); Rev. E. Salomon, *Two lectures on the Native Tribes*, etc. (1855); G. Fritsch, *Bemerkungen*, etc., in *Zeitschrift der Gesellschaft für Erdkunde*, Berlin, 1868, and recent Blue Books.

Becker, NICOLAUS, was born near Aachen in 1810. Until 1840 he was an obscure lawyer's clerk, when he was inspired to write the famous patriotic song now known as the *Wacht am Rhein*. For a moment he became the most popular man in Germany, but he published a volume of lyrics that destroyed his reputation, and he died almost forgotten in 1845.

Becker, WILHELM ADOLF, the son of a distinguished archæologist, was born at Dresden in 1796. He followed in his father's footsteps and became professor in the university of Leipzig. His two clever books, *Charicles* and *Gallus*, descriptive of Greek and Roman life respectively, are still appreciated. His *Handbook of Roman Antiquities* was completed after his death in 1846 by Marquardt.

Beckerath, HERMANN VON, born at Crefeld, North Germany, in 1801, was sent to the Diet in 1843 as representative of the Rhine province. In 1848 he had risen to be finance minister to the empire, and next year was sent to confer with the Prussian government as to the general state of affairs. Finding among his colleagues a tendency to go beyond the limits of his moderate Liberalism, he resigned office, dying in 1870.

Becket. [A'BECKET.]

Beckford, WILLIAM, born in Jamaica in 1709, was sent to England early and educated at Westminster. He was a prosperous West India merchant, and by his wealth and ability took a high place in the City, being elected alderman, and Lord Mayor (twice), and M.P. He was a Whig of rather advanced views, and ventured to enter into a personal argument with George III., when that king received with disfavour a petition from the Corporation. This achievement is commemorated by a statue in Guildhall. Beckford died in 1770, a few weeks after his audacious interview with his sovereign.

Beckford, WILLIAM, the only son of the foregoing, whose great wealth he inherited, was born in 1760. He spent several years in travel, living for a time in Oriental magnificence at Cintra, near Lisbon. In 1784 he published in French *The History of the Caliph Vathek*, which was translated into English, and enjoyed an unmerited reputation. He devoted seventeen years and more than a quarter of a million of money to rebuilding Fonthill Abbey, his father's old house near Bath, but sold it in 1822 soon after it was finished. He then made for himself a mysterious and luxurious abode in Bath itself, where he spent his last years in almost solitary study. Towards the end of his life he published two volumes of travels in Italy and Spain. He died in 1844.

Beckmann, JOHANN, was born in 1739, and educated at Göttingen, where in 1770 he was appointed professor of rural economy, and by his lectures and numerous treatises did much towards the creation of scientific agriculture. His best known work, however, is a *History of Inventions*, which has been translated into several languages He died in 1811.

Beckx, PETER JOHN, was born at Sichem in Belgium in 1795, and joining the Society of Jesus in 1819, became one of its most active members. In 1847 he was Procurator of Austria, but on the expulsion of the Jesuits returned to Belgium as rector of the college at Louvain. He was recalled to Austria, whence in 1853 he went to Rome as general of the order, and his skill and perseverance did much to advance the status of Jesuits. He died in 1887.

Becquerel, ANTOINE CÉSAR (1788–1878), entered the French engineers, and served in the Peninsula. After the peace he was made professor of physics in the Museum of Natural History. He devoted himself to researches in electricity and magnetism, on which he wrote a valuable treatise. His work on *Animal Heat* is highly esteemed, and in conjunction with his son, ALEXANDRE (1820–1891), he brought out a useful book on *Elementary Physics and Meteorology*.

Becquerel, ANTOINE HENRI, professor of physics at the Natural History Museum in Paris, was born in 1852. While studying uranium, in 1896, he observed that it gave off an invisible radiation which traversed metals and other opaque bodies as well as transparent ones. This metal was the first found of the radio-active substances, and the rays from these were named Becquerel Rays. They have the properties that X-rays possess, and are of an extremely ultra-violet colour —that is, they are transverse ether waves. In 1903 the Nobel Physics Prize was divided between Professor Becquerel and Monsieur and Madame Curie of Poland.

Beckerck, or BECKSKERICK, a market town and capital of the circle of Torontal, Hungary, situated on the Bega, a tributary of the Theiss, 45 miles S.W. of Temesvar.

Bedchamber, LORDS AND LADIES OF THE. An English king is waited on by twelve Lords of the Bedchamber (under a Groom of the Stole, who attends only on State occasions), and by thirteen grooms of the bedchamber, who perform their functions in turn. The Groom of the Stole receives £2,000 a year, each Lord £1,000, and each groom £500. Under a queen these officials are replaced by a Mistress of the Robes (salary £500), nine ordinary and three extra Ladies of the Bedchamber and nine ordinary and four extra Bedchamber Women (salary £300). All these are members of the highest nobility, and the posts are much sought after. The refusal of Queen Victoria to allow her Bedchamber Ladies to resign along with the change of Government in 1839 caused Sir R. Peel to refuse to form a Ministry, and led to the return of the defeated Ministry of Lord Melbourne.

Beddoes, THOMAS (1760–1808), studied at Oxford under Sheldon, and in 1786 was appointed reader in chemistry. He translated works of Spallanzani, Bergman, and other scientists. In 1792 he was driven from Oxford owing to his liberal opinions. In 1798 he established a hospital at Bristol for the cure of diseases by inhalation, and here Humphry Davy was his assistant. The experiment was not a success.

Beddoes, THOMAS LOVELL, son of the preceding, born at Clifton in 1803, his mother being a sister of Miss Edgeworth. Educated at the Charterhouse and Oxford, he went abroad to study medicine, but his Radical views got him into trouble. His genius lay in the direction of poetry. His *Improvisatore* was published in 1821, and his *Bride's Tragedy* in 1822. *Death's Jest Book*, a volume of miscellaneous verses, appeared after his decease, which occurred somewhat mysteriously in the hospital at Basle in 1849.

Bede, BEDA, or BÆDA, known as "The Venerable Bede," was born about 673 near Monkwearmouth in the county of Durham. According to his own account he took deacon's orders at the age of nineteen, having been educated by the Abbot of Wearmouth and Jarrow, and in those twin monasteries he devoted his life to his priestly duties, to the work of teaching, and to the vast literary labours that have made him famous. Of nearly fifty treatises which he left, half consist of commentaries on Scripture, several deal with the science and philosophy of his day, others are lives of saints and martyrs, or of the abbots of the foundation. But the most valuable of all is his *Ecclesiastical History*, which gives the fullest and most authentic account we possess of the period ending four years before his death, which occurred in 735. Bede wrote chiefly in Latin, and King Alfred translated parts of his works into Anglo-Saxon. How he acquired the title of "Venerable" is unknown, but it is inscribed on the only fragment of his shrine that is left in Durham cathedral.

Bedeau, MARIE ALPHONSE, a French general, born 1804, died 1863. After taking part in military operations in Algeria, he was in 1848 appointed to suppress the disturbances in Paris, but failed completely. On the *coup d'état* in 1851 he was arrested and retired into exile.

Bedeguar, a gall-like disease found on wild roses, produced by the puncture of a gnat, *Rhodites rosæ*. It is a many-chambered gall, made up of a ball-like tuft of adventitious leaves reduced to hairs, and becoming a bright red, whence its popular name of Robin Redbreast's pin-cushion.

Bedell, WILLIAM, born in Essex in 1570 and educated at Cambridge, held a cure at Bury St. Edmunds, and was there appointed chaplain to Sir H. Wotton, the English ambassador at Venice. On his return he filled for two years the provostship of Trinity College, Dublin, and was next appointed bishop of Kilmore and Ardagh. His zeal and charity won him such respect that in the Protestant massacre of 1641 his life was spared, but the shelter which he gave to other fugitives led to his imprisonment, and he died as soon as he was released in 1642.

Bedell, the bearer of the mace in public processions in a university.

Bedford, a market town and municipal and parliamentary borough, the capital of Bedfordshire, 50 miles N.W. of London, on the London and North-Western and Midland railways, and extending along either bank of the river Ouse. It is well-built and has five churches, St. Peter's containing traces of Saxon work, and St. Mary's possessing a Norman tower. There are a corn-exchange, shire hall, and infirmary. But the schools raised on the original foundation of Sir W. Harpur (1561) are the most important institutions, and have induced many families to settle in the town. The factory of Messrs. Howard, makers of agricultural implements, employs a large number of artisans, and lace and straw plaits are also staple products. The memory of John Bunyan, who was born at Elstow, close by, is perpetuated by a statue and a school. Pop. (1901), 35,144.

Bedford, NEW, a port of considerable size in Massachusetts, U.S.A., 55 miles by railway from Boston. Whale-fishing, ship-building, and candle-making are the chief industries.

Bedford, JOHN, DUKE OF, the third son of Henry IV., was born in 1389. His brother Henry V. on his death-bed (1422) bequeathed to him the task of consolidating the English power in France as regent, and this duty he endeavoured to fulfil. Marrying a daughter of the Duke of Burgundy he established himself in Paris, and defeated the Dauphin at Crévant and Verneuil. But the pacific policy of Cardinal Beaufort deprived him of aid from England, and the designs of the Duke of Gloucester on Hainault alienated the Duke of Burgundy. At this moment Joan of Arc infused new life into the patriotic cause, and Bedford was forced to abandon the siege of Orleans. Though he drove back the Dauphin from Paris, captured the Maid and consigned her to the stake, he never

succeeded in regaining his old supremacy. On the death of his wife he concluded a marriage which finally estranged the Duke of Burgundy, who opened up negotiations with Charles VII. Bedford, worn out with disappointment and anxiety, died in 1435 and was buried at Rouen.

Bedford Level is the name given to a large tract of very flat country extending from the Wash into S.W. counties. It is quite level, and it was here that the experiment of testing the earth's roundness was tried. The Bedford level covers 750,000 acres.

Bedfordshire is bounded on the N. by Northamptonshire, on the E. by the counties of Huntingdon, Cambridge, and Hertford, and on the W. by those of Buckingham and Northampton, and has an area of 461 square miles, being one of the smallest counties in England. The surface is mostly flat, but the Chiltern range of chalk hills rises to 500 ft. towards the S. The alluvial soil of the central district yields heavy crops of wheat. It is watered by the Ouse, Ivel, Lea, and Ouzel. Bedford, Dunstable, Luton, and Leighton Buzzard are the chief towns. Many fine seats are found in the county, notably that of the Duke of Bedford, Woburn Abbey. Pop. (1901), 174,958.

The name of Bedford has been given to three counties in the United States, in Pennsylvania, in Virginia, and in Tennessee.

Bedlam, a corruption of Bethlehem, the name of a hospital founded and dedicated to St. Mary, in 1247, by Simon FitzMary, a sheriff of London. He built a priory in Moorfields and connected it with the episcopate recently established by the Crusaders in the Holy Land. In 1402 the lunatics in a public asylum at Charing Cross were believed to have been transferred there. In 1546 Henry VIII. gave the hospital to the City, which had already purchased the lands, and it was united to Bridewell. Little is known of the institution until 1675, when a new hospital was built, architecturally a copy of the Tuileries, on the S. side of Moorfields. This is the Bethlehem or Bedlam that was famous in the 18th century. In 1812 the existing asylum in Lambeth Road was begun from designs by Lewis, but Smirke added the dome. It accommodates 400 patients, who are chosen as far as possible from the curable sufferers from lunacy.

Bedlington Terrier, a breed of terriers, said to have originated at Bedlington, near Morpeth, in the early part of the nineteenth century. It is chiefly confined to the northern districts, and in Newcastle and the neighbourhood nearly every man has a Bedlington. Vero Shaw (in his *Book of the Dog*) quotes the following as the chief points of the breed: "The Bedlington terrier should be rather long and small in the jaw, head high and narrow, crowned with a tuft of silky hair lighter than the body; eyes small, round, and rather sunk; ears filbert-shaped, close to the cheek, slightly feathered at the tips; neck long and slender, but muscular; body well proportioned, slender, and deep-chested; legs straight and rather long; tail small and tapering. Colour liver or sandy, with flesh-coloured nose, or black-blue with black nose." The dog he figures was 18 months old, stood 15 in. at the shoulder, and weighed 24 lbs. Bedlingtons are sharp, active dogs, eager in pursuit of vermin.

Bedmar, ALFONSO DE CUEVA, MARQUIS OF, was born in 1572. He was sent as Spanish ambassador to Venice in 1607, and entered into a conspiracy with the viceroy of Naples and the governor of Milan to destroy the republic. The plot was betrayed and frustrated. It furnished material for Otway's play of *Venice Preserved*. Bedmar went to Flanders, received a cardinal's hat, and was afterwards made Bishop of Oviedo, where he died in 1655.

Bednar, a district and town in the territory of Mysore, Southern India. The former occupies a fertile table-land on the summit of the Western Ghâts, having an elevation of 5,000 feet. The rainfall being very heavy, vegetation is luxuriant. Pepper, cardamoms, areca-nuts, and sandal wood are produced in large quantities. The town, known also as Nuggur, was in the 17th century a prosperous place, as the capital of the rajahs of Ikeri. Haider Ali took it, and in 1783 it surrendered to the British. Tipu Sahib, however, recaptured it, putting General Matthews and the garrison to the sword. It is now much reduced in size.

Bed of Justice (French *lit de justice*), literally the covered throne which the French king occupied when present at the deliberations of Parliament. Hence the term was transferred to those meetings of Parliament at which the king was present. It was the accepted legal theory in France (derived to a great extent from misinterpretations of maxims of Roman law about the Roman Emperor) that the king of a nation was the source of all power in it; and that "on the arrival of the king the powers of the magistrates cease." Hence the decisions given in a bed of justice were held to have a more binding force than the ordinary decisions of Parliament, as proceeding from primary and not delegated authority. Beds of justice were held in order to compel the Parliament to register royal acts, to declare the age at which members of the royal family should be considered to attain their majority, to create new charges, etc. The last was held by Louis XVI. at Versailles in 1787.

Bedouin (properly *bedawi*, plural *bedawin*, from root *badw* = steppe, wilderness), a term applied by the Arabs collectively to the unsettled nomad tribes of steppe lands and oases of the desert, as opposed to the settled and more cultured inhabitants of the towns. From the very nature of the environment the Bedouins are necessarily pastoral nomads depending for their existence on the camel, which enables them to cross vast desert tracts in search of fresh pasturage, and which supplies them with their staple food, cheese, butter and milk eaten with dates, and a few other fruits. The flesh is rarely eaten, but the hide, hair, and sinews serve as materials for the tents, harness, cordage, and many other purposes. They also raise a noble breed of horses, which have served to improve the stock in North Africa, Spain, England, and elsewhere. The Bedouins in general represent the Arab type

in its purity, though considerable differences have been observed in the physique of the various tribes, and even of the sheikhs (chiefs) compared with the common folk within the tribe itself. They are mostly of small stature (5 feet 2 inches), thin and wiry, with swarthy complexion and regular features. They are divided into a large number of *kabeileh* (chief tribes), which again ramify into a multitude of *fendah* (sub-tribes, septs, clans), each group possessing its own camping-ground, and recognising no authority except that of its hereditary chief. The paramount tribes, from whom all the minor groups claim direct or indirect descent, appear to be the Sherarât, Howeitât, Benu Atiyeh, Besher and Anezeh of north and north-west Nejd; the Shomer, Montefik, Mesalikh, Benu Lam, thence east to Mesopotamia; the Ma'az, Harb and Kahtân, west and south-west of Nejd; the Seba'a (with a large offshoot in Syria), Meteiz, Oteibah, Dawâsir (A'al Amar) in the central steppe lands; lastly the Ajmân, Benu Khaled and Benu Hajar in the extreme east. The Arabs, who since the rise of Islâm have spread over the surrounding regions (Mesopotamia, Syria, Egypt, North Africa), belong mainly to the Bedouin class, and many of their chiefs claim descent from the Khoreish, Mohammed's tribe, and even from the prophet himself, in this case taking the title of *sharif*. A characteristic trait of the Bedouins is their zeal for the purity of the Arabic language, which is consequently spoken with surprising uniformity throughout the whole of the Arab domain, from the Persian Gulf to the Atlantic. *See* Palgrave, *Journal R. Geographical Society*, 1864, vol. xxxiv.; and Wüstenfeld, *Genealogische Tabellen der Arabischen Stämme*, etc., Göttingen, 1852.

Bed-sores, a complication of diseases in which a prolonged confinement in bed is associated with extreme prostration, and particularly with the continued maintenance of the same position, the patient always lying on the back or on one side. Bed-sores occur in situations exposed to pressure, but they very rarely develop when the patient is under the supervision of a watchful nurse. Ignorance, neglect, or want of cleanliness are their most common causes; still in certain paralytic cases acute bed-sores appear in rare instances in spite of all precautions, being then apparently due to the involvement of nerves which govern the nutrition of the skin. Change of position, when that is possible, a smooth, tightly-drawn sheet, or, if necessary, a water bed to lie upon, scrupulous cleanliness, constant watchfulness over parts exposed to pressure, with the use, if the skin becomes reddened, of air cushions, or the application of alcohol or glycerine; these are the main preventive measures. If an open sore once forms, it is high time for the case to come under skilled medical treatment.

Bed-straw, the popular name of several species of the Rubiaceous genus *Galium*, fourteen of which are British. They are herbaceous plants with square stems, small opposite leaves, and inter-foliar stipules so much resembling the leaves that the latter are generally said to be in whorls of from four to ten. They have small flowers with a minute calyx, a four-lobed rotate corolla, either yellow or white, and a dry fruit of two one-seeded carpels. Legend associates *G. verum*, the yellow-flowered Our Lady's Bed-straw, with the flight into Egypt.

Bee. The bees, of which the honey bee (*Apis mellifica*, Linn.) is one of the best known and most important, belong to the family *Apidæ* of the order HYMENOPTERA. The most conspicuous feature in the natural history of the honey bee is that it is social, living in communities composed of as many as 50,000 individuals, belonging to three different forms. The female is known as the queen bee, and there is usually only one in each hive; it is recognisable by its superior size and long pointed abdomen. The males are known as drones because they take no part in the general work of the hive; they are characterised by the bluntness of the abdomen, the thick flat body, and the absence of a sting. They seldom constitute more than three per cent. of the total population of the hive, and their sole function is the fertilisation of the queen; after they have accomplished this, they are ruthlessly massacred by the workers; if the hive be without a queen, the males are allowed to live till one be reared. The workers, the third kind of bee, are rudimentary females; they do the whole work of the hive, collect the honey, secrete the wax, build this into comb, feed and rear the larvæ, and defend the hive against attack; their true sexual nature is shown by their occasionally laying eggs, which are, however, either unfertile or produce only drones. The workers are armed with a sting, a fine, sharp, barbed tube which can pierce the skin of an opponent and deposit there a drop of poison; as the sting cannot be withdrawn from the wound, it is torn away with its attachments, and thus its use is fatal to its possessor. The queen bee continues to lay eggs for a long time after fertilisation; by varying the food supply to the larvæ, the workers can cause these to develop into drones, queens, or workers. If the queen be not fertilised she can lay eggs (a case of PARTHENOGENESIS), which, however, only develop into drones. In the absence of a queen, some of the workers lay eggs, but these again only develop into drones. The ventilation of the hive is effected by bees holding to the base of the hive by their feet and then vibrating their wings as in flight; currents of air are thus sent through the passages. The main food of bees is honey, which is collected from the nectaries of plants during the summer and is stored up in cells in the hive for winter use; pollen is mixed with that used for the food of the larvæ. The comb is constructed of fine wax which is secreted from the abdomen. The main senses possessed by bees appear to be hearing (by the antennæ) and smell; the former sense is very irregularly developed; bees can certainly hear sounds made by other bees, but their appreciation of other sounds seems very capricious. The sense of smell appears the more important; by it bees can at once recognise those from another hive, as they at once attack strangers who gain admittance to the hive; when breeders have to introduce other bees, the sense of smell has to be temporarily deadened by the use of some

strong aromatic. The honey bee is supposed to be of Asiatic origin, and was introduced to America from Europe. In some humble bees the larvæ at first all become workers which lay eggs producing only drones; but as later larvæ develop under more favourable conditions, as they receive more attention, they give rise to forms that are sexually mature and capable of producing queens. This affords a clue as to the evolution of the complex social system of the honey bee. Hüber, the blind naturalist, is the source of much of our information respecting bees, while among later investigators Maeterlinck and Lord Avebury are pre-eminent.

Beech, the English name of *Fagus sylvatica*, a large and handsome tree belonging to the order *Cupuliferæ* (*Quercineæ*). It reaches a height of 60 or 70 feet and a diameter of 3, 4, or even 5 feet. Its bark is thin, smooth, and silvery; its

LEAF OF BEECH (*Fagus sylvatica*).

buds brown and pointed; its leaves hairy and pointed only when young; and its fruit consists of three-cornered nuts produced in pairs in a rigid brown husk which bears recurved hooks externally and splits into four valves. The wood is excellent for fuel and charcoal, and is used for tool-handles, and, more especially, for chair-making. From 12,000 to 15,000 loads of beech timber are annually employed for this last purpose round High Wycombe, Bucks, where it is grown on the chalk of the Chiltern Hills. The nuts yield a useful oil and are still valued in northern Europe as food for swine. The Copper Beech is a variety, merely differing in the colour of its leaves; but the genus is very widely distributed, being represented in New Zealand, Tasmania, and Antarctic America, as well as throughout the northern hemisphere.

Beecher, HENRY WARD, the son of Dr. Lyman Beecher, a well-known American theologian, and president of the Lane Seminary, was born at Lichfield, Connecticut, in 1813, and graduated at Amherst College. Entering the Presbyterian ministry he soon acquired reputation by his eloquence and vigour. In 1847 he was chosen pastor of the Plymouth Congregationalist church, Brooklyn, and drew around him a large following. He preached a broad, attractive form of Christianity, taking also an active interest in politics as an abolitionist. In 1863 he visited England to advocate that cause. He became the subject of an unpleasant scandal in 1874, but a judicial investigation failed to procure a verdict. His independent views on the question of eternal punishment led to his secession in 1882 from the Congregationalists. In 1886 he paid a second visit to England. He died in the following year. Mr. Beecher was a prolific contributor to periodicals, and edited for some years the *Independent* and the *Christian Union*. His most popular works were *Lectures to Young Men*, *Life Thoughts*, and a novel entitled *Norwood*.

Beechey, FREDERICK WILLIAM, naval officer and Arctic explorer, was born in 1796, and having entered the Royal Navy in 1806, took part, in 1811, in Schomberg's action off Madagascar, and became a lieutenant in 1815. He was then serving with the expedition against New Orleans. In 1818, in the *Trent*, he accompanied Franklin, and in 1819, in the *Hecla*, he accompanied Parry, to the Arctic regions. He was next engaged upon inland surveys in Northern Africa, and was made a commander in 1822. In 1825–28 he commanded the *Blossom*, and attempted to discover a north-west passage. Incidentally, during this long voyage, he made numerous discoveries in the Pacific, his course lying round Cape Horn and through Behring Strait. While absent he was, in 1827, advanced to post-rank. As captain of the *Sulphur* he surveyed much of the South American coast in 1835–36. He attained the rank of rear-admiral in 1854, and died in 1856. Admiral Beechey was the author of *Proceedings of the Expedition to Explore the Northern Coast of Africa*, 1823; of *A Voyage of Discovery towards the North Pole*, 1843; and of a *Voyage to the Pacific and Behring Strait*.

Beech Marten. [MARTEN.]

Bee-eater, any bird of the genus Merops, with twenty-one species, the type of the family MEROPIDÆ, which is found all over the Ethiopian and Oriental, and penetrating into the Palæarctic and Australian regions. The name is often extended to the whole family, but is popularly confined to the common Bee-eater (*M. apiaster*), common on the shores of the Mediterranean, and occasionally straying to England. In winter it migrates to South Africa, where it incubates a second time. In size the adult male is rather less than a starling; the top of the head is rich chestnut-brown, which extends over the neck, back, and wing coverts, and changes to light reddish-yellow on the rump; the primaries and secondaries are bright blue-green tipped with black, the tertiaries are green; upper tail coverts blue-green tipped with black, tail green tinted with a darker hue; chin and throat reddish yellow, round the latter a deep blue-black band; under surface of the body bluish-green, of wings and tails greyish-brown. In the female the hue of the throat is paler, and a reddish tinge runs through the body and wings. They nest in river banks or in holes or tunnels in the ground, and prey upon bees, wasps, and other insects. Large numbers of these beautiful birds are annually shot to provide plumes for ladies' bonnets and hats, and in one

spring 700 were killed at Tangiers, and the skins consigned to a London dealer.

Beefeater (*i.e.* dependent: the supposed connection with *buffetier*, attendant at a buffet or sideboard, is given up), a popular name for the Yeomen of the Guard (q.v.) and of the warders of the Tower of London, who were named Yeomen Extraordinary by Edward VI., and wear the same uniforms as the regular Yeomen. The former first appeared at the coronation of Henry VII., and attend the sovereign at royal banquets and other state ceremonies.

Beefeater, a popular name for any bird of the genus Buphaga, of the Starling family, with two species from Tropical and Southern Africa. They differ from the true starlings in having a stout hard bill, swollen just behind the tip, bare nostrils, very short stout feet, furnished with very sharp curved claws. These birds owe their popular and generic names to their habit of perching on cattle and feeding on the parasites which infest them. The best known (*B. Africana*) is from 9 in. to 10 in. long, dull brown on upper surface, chin, and throat, buff beneath, basal half of bill rich orange, extremity scarlet.

Beef-tea, a valuable article of invalid dietary, made by infusing lean beef in warm water. Much misconception exists with respect to the usefulness of beef-tea in disease. As ordinarily made it is rather a stimulant than a form of diet, and if given with the idea of nourishing the patient it should be recognised that such dilute material is only administered because nutriment in a more concentrated form would not be tolerated. Beef-tea, in fact, contains only mineral salts, extractive substances, and gelatine, with but a very small quantity of the albuminous constituents of the original meat. While, however, such a substance is of but little use to a stomach which can deal with material more sustaining, experience seems to show that it is admirably adapted for the enfeebled digestive powers of febrile patients.

To make beef-tea a pound of good beefsteak should be cut up small, placed in a jar, and soaked for an hour or more in a pint of water, the jar being then transferred to a pan of water, which is allowed to simmer over the fire for another hour. The infusion is then strained, and a few pinches of salt added. If it is desired to extract the more nourishing constituents of the meat, the latter should be soaked in brine, and then subsequently gently heated, carefully noting that the temperature does not exceed the coagulating point of albumen; if a considerable amount of salt has been originally employed (a procedure necessary if it be desired to extract all the nourishing material of the meat), this must be subsequently in part removed by dialysis. Beef-tea made by the latter process, as compared with the former, is not so palatable, though far more nutritious.

Bee-hive. [HONEY.]

Beehive Houses, the name given to certain primitive structures, built generally of unhewn stones without cement, and having a domed roof, like the common straw hive. These rude houses are principally found in Scotland and Ireland. The majority of them are of great antiquity, but some have been constructed within the last century, and a few are even now used as human habitations. As

BEEHIVE HOUSES.

to the origin of these beehive houses, Lord Dunraven (*Notes on Irish Architecture*, ii. 136) says:—"The dome, formed by the projection of one stone beyond another till the walls meet in one flag at the apex, and the use of the horizontal lintel in the doorways, are forms universally adopted by early races in all periods of the history of man and in various portions of the globe, before the knowledge of the principle of the arch had reached them." In Scotland and Ireland two forms exist, which may be called ecclesiastical and secular. Beehive cells of undoubted monastic origin are found on some of the islands off the coast of Kerry. The most remarkable are those on Skellig Mhichel (St. Michael's Rock). There are five of these cells, and the largest is nearly circular externally, but the interior is oblong (15 ft. × 12 ft.). The walls, which rise vertically for 7 ft. or 8 ft., converge internally as each stone projects a little more inwards than the one immediately below it, until at the height of 16 ft. 6 in. the beehive-shaped roof is finished by an aperture, probably once covered by a single stone. In the south-west of Ireland the remains of these structures are common, but they were probably used as ordinary dwellings. In Scotland their use continued to quite a recent period, and it is more than likely that some of them in Lewis are still inhabited during the time the inhabitants are making cheese and butter in the summer and early autumn. The following account of a double beehive house in Lewis is abridged from Dr. A. Mitchell's *Past in the Present*:—"The house consisted of two hive-like hillocks, joined together, and not much higher than a man, built of dry stones [in the manner described above], and covered with grass and weeds to keep out wind and rain. There were two apartments—a living room and a storehouse or

dairy. At the right hand of the entrance was the fireplace, and the smoke passed out at the uncovered apex. A row of curb stones 8 in. or 10 in. high served as seats, and at the same time to separate the bed—some hay and rushes strewn on the floor—from the rest of the house. Three niches or presses completed the furniture of this primitive dwelling." The same author notes that three forms of these dwellings occur—(1) single huts, (2) double huts (as described above); (3) several huts communicating internally, and presenting the appearance of an "agglomeration of beehives." Single beehive huts are still built in Orkney and Caithness as shelters for pigs and poultry.

Beelzebub, a name formed by combining the Chaldean *Baal* (q.v.) with *zebub*, signifying "insect," and signifying therefore the "fly-god," or averter of insects (cf. Gk. *Zeus Apomuios*). Under this particular aspect Baal appears to have been worshipped at Ekron (2 Kings i. 2) and elsewhere. It seems probable that the Jews borrowed the name from their idolatrous neighbours and used it as an appellation of Satan. However, in the Gospels the word is uniformly spelt Beelzebub, the etymological signification of which might be *Lord of the Mansion* or *of idols*, or *Lord of dung*. This fact has led Gesenius, Lightfoot, and other learned divines to the belief that this is the original form of the name, but, if the final *l* in the New Testament is not due to an error in transcription, it is more likely that the Jews made a slight variation in pronunciation so as to cast contempt on a false god.

Bee-Martin. [KING-BIRD.]

Beer, an alcoholic beverage obtained from grain—generally barley—by a process known as Brewing (q.v.). Different kinds of beer vary in strength and colour, according to the nature and quantity of the different ingredients used in the manufacture. The percentage of alcohol in beer varies from two per cent. in light table ales to six per cent. in Burton ales, porter, etc. [ALE.]

Beer Money. From 1800 to 1873 an allowance of 1d. a day was made in lieu of beer and spirits to non-commissioned officers and men in the British army when on home service. In 1873 it was included in their pay.

Beersheba, or BIR-ES-SEBA (Heb. *Well of the Oath*), a village in the south of Canaan which derives its name from the oath there taken by Abraham and Abimelech (Gen. xxi. 31). "From Dan to Beersheba" is an expression often used in the Scriptures to describe the whole extent of the country, and the saying has become proverbial. The village became an episcopal city in later times and existed until the 14th century. The site is only marked now by two wells and a few stones.

Beestings (exact derivation unknown), the first milk after the birth of offspring, containing numerous fat granules or colostrum corpuscles, lacking casein, but rich in albumen, and containing three times as much salt as ordinary milk, which probably gives it a purgative effect. Occasionally it has been used in cooking.

Beeswax, a solid fatty substance secreted by bees—not, as is sometimes supposed, collected from plants—and formed into the cell walls of the comb. Being lighter than water (specific gravity ·969), and melting at 64° to 65° Fah., it can be readily separated by drawing off the honey and melting the comb in boiling water, and then collecting the wax which floats to the surface and solidifies as the water cools. It is largely used for the manufacture of candles and of wax figures.

Beet, the name for various forms of the chenopodiaceous genus *Beta*, coarse, weedy plants, furnishing edible roots and leaves. They have perfect flowers with a persistent five-leaved perianth, five superposed stamens, and a one-seeded, one-chambered ovary. *Beta maritima*, the sea beet, a British plant, is very variable, and is perhaps the parent of all the cultivated forms. *B. rubra*, the red beet, cultivated by the Romans, but only introduced into England in 1656, is valued for its sweet, fleshy, red roots, eaten in salad. *B. alba*, the white or sugar-beet, has been largely grown for sugar on the continent of Europe since the time of Napoleon I. It yields about 7 lbs. of sugar from 100 lbs. of roots, and over 2½ million tons are made annually, especially in France, Silesia, and Russia. *B. Cicla*, Sicilian beet, is grown for its leaves or their midribs, eaten as spinach or sea-kale. *B. Cicla*, var. *macrorhiza* (the large-rooted variety) is the mangold or mangel-wurzel, a most important food for cattle. Other forms are grown for their glossy ornamental foliage.

Beethoven, LUDWIG VAN, one of the greatest among the musicians of Germany, was born at Bonn on the Rhine on December 16th, 1770. His family was of Dutch extraction. He began his musical studies with his father, Johann, a tenor vocalist, in the year 1775. The tendency of his musical mind was discovered by his grandfather, after whom he was named, and to whom he was sincerely attached. The grandfather died when Beethoven was in his third year, and with his death ceased the only happy hours young Ludwig is said to have enjoyed in his life. His father Johann, who had unfortunately given way to habits of drunkenness, thought to make money out of the talents of his child, and kept him to his musical studies with a severity, not to say cruelty, which almost disgusted him with the very name of music. When he was nine years of age the father engaged a fellow vocalist and boon companion, called Pfeiffer, to help in the instruction of his child, and their united efforts certainly produced good results, for not only did the boy master all the technical difficulties of the violin and pianoforte, but his mind expanded, and he was able to give his thoughts expression at a very early age. He was wont to say in after years that he had learned more from Pfeiffer than from anybody else. He never received more than the simplest kind of school education, but his desire for knowledge was great, and even as a boy he sought to make acquaintance with the

great writers of the chief European nations, and he acquired, almost without help, a smattering of Latin, French and German. The organ he learned from the Court organist, the Fleming Van den Eeden, an old friend and fellow countryman of his late grandfather. He continued his organ studies with Neefe, the successor of Van den Eeden, and even in his twelfth year was skilful enough to act as his deputy.

In 1787 he visited Vienna for the first time, and was introduced to Mozart, who, when he heard him play, said prophetically, "Take heed to this youth, one of these days he will make a noise in the world." Through the interest of his friend Count Waldstein, the Elector Max Franz sent Beethoven to Vienna in 1792 to continue his studies with Haydn, Salieri, and Albrechtsberger. He did not take kindly to the teaching of Haydn, for although he dedicated his three pianoforte sonatas (op. 2) to his master, he declined to insert on the title page "Pupil of Haydn," giving as his reason that "he had never learned anything of him." He took lessons from Salieri on the art of writing for the voice, and so highly did he value his teaching that he was never too proud to call himself his pupil. He passed through the drudgery of learning the art of counterpoint with Albrechtsberger with painstaking patience. He also learned to play the viola, the violoncello, the clarinet and the horn in his own obstinate, self-willed way; and although his teachers had a high regard for his genius he never succeeded in making himself agreeable to either of them. He visited Prague, Nuremburg, Dresden, Leipzig and Berlin; was graciously received in the last named place by Frederick William II., and presented with a snuff-box full of gold pieces. "Not an ordinary snuff-box," he would say to his friends, "but one of the kind usually given to ambassadors." In 1800 he left the hospitable shelter of the Lichnowsky palace for lodgings, where he felt he could follow his career with greater freedom. In the year following he experienced the first symptoms of the malady which embittered his remaining years, for it never yielded to medical treatment, and in 1810 he became totally deaf. His position in the world of music was by this time assured, and his brothers Carl and Johann followed him to Vienna. The last named had acquired some property, and on one New Year's Eve sent his brother Ludwig a card on which he described himself as "Land owner." After having written on the back the words Ludwig van Beethoven, "Brain owner," he returned the card. By this it may be gathered that Beethoven had some appreciation of humour, though his deafness somewhat isolated him from the world and he appeared to be misanthropical. When the poet Goethe met him in 1812, he wrote to Zelter, his friend, "I made acquaintance with Beethoven at Töplitz. His marvellous talent astounded me. But, unfortunately, he is an utterly untamed character. He is not indeed wrong in finding the world detestable. Still his finding it so does not make it any more enjoyable either to himself or to others." He became more and more secluded from the world, and when he took the guardianship of his nephew Carl in 1815 the extravagances and evil conduct of this young man so affected him that he became more and more retiring and engrossed in musical composition. He caught cold driving in an open chaise, and ultimately succumbed to an attack of inflammation of lungs and dropsy, dying during a thunderstorm on March 26th, 1827. He was buried in the Währing Cemetery in Vienna. His remains were twice disturbed. They were exhumed and reburied October 13th, 1863, and on June 21st, 1888, they were removed to the Central Cemetery at Summering, where they now rest close to the graves of Schubert and Mozart.

In personal appearance Beethoven was of medium height, a broad and firm frame; his head large, his hair black and plentiful; he shaved close, though at times he allowed his beard to grow for several days; his eyes were large, black, and piercing; his voice rough, except when influenced by feeling, when it was soft and tender in tone.

As a composer his music is marked by deep and earnest thought. He always worked with an ideal in his mind, and his music is the expression of some mental imagery and poetical emotion. In his later years the strength of his utterances became deeper, more energetic, and appeals with power as great in its way to musicians as the words of Shakespeare among poets.

The wealth of imagery, the grandeur of his imagination, the character of gloom and melancholy which pervades certain of his music has been compared to the poetry of Dante, so that Beethoven as a musician is held to be as eminent as the greatest of poets.

His works, which comprise orchestral and symphonic compositions, chamber music, the opera *Fidelio*, two masses, and other vocal music with pianoforte pieces, and present differences of style varying according to the date of production, have been arranged in three periods, each the development and expansion of the other. The first period or style is found in his music produced up to the year 1800, when the sway of art as then known was greater than his own individuality. In the next, which began with his second and ended with his eighth symphonies (1814), the strength of his genius was more manifest. The third period (1815 to his death), which includes his ninth symphony, is that in which the most poetical and even prophetic sides of his genius were more powerfully displayed. His symphonies form the backbone of all good orchestral concerts, his chamber music is more popular than ever, his sonatas form the groundwork for study among pupils, and the opportunity for the display of the abilities of the best executants, and the influence of his music spreads wider every day. His compositions have been enumerated by Nottebohm, who has also given details concerning them. His life has been ably written by Schindler (translated by Moscheles), by H. A. Ruding (Sampson Low & Co.), by Sir George Grove (*Dictionary of Music*), and by others in French, German, and in English.

Beetle is the popular name for the members of that order of insects known as Coleoptera, in

which the anterior pair of wings are converted into hard, horny cases (elytra) used to protect the pair of membranous flying wings. The order is a highly organised one, and contains upwards of 80,000 species. The term, like most of those in popular use, is very loosely applied, and it includes many insects which are not true beetles, such as the black beetle (an Orthopteran, q.v.). The account of the order is therefore given under COLEOPTERA.

Beets, NICOLAS, was born at Harlem in 1814, and studied theology at Leyden. He won early distinction as a Dutch poet of the Byronic school. His poems appeared at intervals from 1834 to 1862. In history and criticism he achieved some distinction, and his theological attainments were so great that he was in 1874 appointed professor of that subject at Utrecht. He died in 1903.

Beet Sugar. [SUGAR.]

Begg, JAMES, D.D., born in 1808 in Lanarkshire and educated at the University of Glasgow, entered the ministry and held for some years the cure of Liberton. At the disruption of the Scottish Church in 1843 he joined the Free Church, and until his death in 1883 was pastor of Newington, Edinburgh. He was conspicuous among the old orthodox school of divines for his intellectual capacity, genial humour, and controversial vigour. He took an active interest in the housing of the poor.

Beggar my Neighbour, a simple game of chance at cards, played by two or more persons. The pack being dealt equally to each, each in turn lays down a card until an honour appears. This must be paid for by the next player, on a scale varying from four for the ace to one for the knave; the player who has laid down the honour then takes the whole of the cards lying on the table. Should another honour appear among the cards laid down in payment, the next player has at once to pay for it similarly, and so on. The object is to obtain all the cards. The game is mentioned as existing in 1777.

Beghards. [BEGUINES.]

Begonia, a genus of herbaceous plants, natives of the East Indies and of tropical America, the

BEGONIA REX.

type of a somewhat isolated order of Dicotyledons, related perhaps to the *Saxifragaceæ*. The genus is named from Michel Begon, a Frenchman, and comprises some 350 species. The leaves are alternate, stipulate, and so markedly oblique as to have suggested the name *elephant's ear* for the genus. The flowers are unisexual, having a perianth of four leaves in the staminate ones and five leaves in the pistillate. The stamens are numerous; the carpels, three, forming a three-winged inferior ovary with a spiral stigma round its style. The plants are readily propagated by cuttings of their leaves which produce adventitious buds. Some species have tubers, and these have recently been improved by cultivation until their flowers, which are white, yellow, orange, pink, crimson or scarlet, have reached a diameter of two or three inches.

Beg-shehr, or BEI-SHEHR, a lake, river, and town in the province of Karamania, Asiatic Turkey. The lake is about 20 miles long, by 5 to 10 miles broad, and was known to the ancients as Lake Coralis. The river issues from the S.E. extremity and connects it with Lake Sogla. The town on the right bank of the river and near its exit has the remains of some handsome buildings, including a large mosque, but is lapsing into decay.

Beguines. Prompted partly by pious motives, partly by the advantages of the "religious" profession, there sprang up in the Middle Ages a class of persons who without taking strict vows devoted themselves to mendicancy and good works. Women usually of social position and either widows or spinsters adopted this life in the Netherlands about the 12th century under the name Beguines. Some trace the word to Begg or Le Bègue, a supposed founder of the community, others to St. Bègue, and others again with greater probability to a verb meaning "to stammer." They spread over France and got a footing in England, being protected by the Church, but everywhere became gradually absorbed into the inferior order of Franciscans, excepting in Germany and Belgium, where *béguinages* still exist. The male members were known as Beghards, but they developed into a mystical and perhaps socialistic sect, rebelled against the Pope, were suppressed, and ultimately disappeared among the Franciscan *tertiarii*, to whom they were closely allied. In Italy they were known as Bizgocchi or Boccasoti.

Begum, an Indian title of honour equivalent to *Princess*, usually borne by the mothers, sisters, or wives of native rulers, or by women regnant in India. (For the robbery of the Begums of Oude *see* HASTINGS, WARREN.)

Behaim, MARTIN, mathematician and astronomer, was born at Nurnberg about 1460. He pursued a commercial career until 1480, when he went to Lisbon and became noted as a maker of maps. In 1484-86 he accompanied Diego Cam on a voyage of discovery along the W. coast of Africa, reaching as far as the Congo river. During the years 1491-93 he constructed a terrestrial globe, which is still preserved in Nurnberg. He died in Lisbon, 1507.

Behar, a Bengal town, in the Patna district, has a great inn for Mohammedan pilgrims. It

ntains some ancient mosques and the ruins of an d fort.

Behar, BAHAR, or BEYHAR, a Hindostan ovince in Bengal, area 44,139 square miles. raversed by the Ganges, it has also extensive canal and irrigation systems. It is the most densely peopled province of India, and produces indigo and opium extensively. As the cradle of Buddhism it is a holy land to the followers of that religion.

Behistun, a mountain near a village of the same name in Persia, province of Irak-Ajemi, celebrated for the sculpture and inscriptions cut out on its side. The principal of these relates to Darius Hystaspes, who is represented with a bow in his hand, and a number of captives before him chained together by the neck, and with his foot upon one. These inscriptions are at an elevation of 300 feet from the ground, and the labour expended in cutting them out must have been enormous. Their probable date is 515 B.C. There are other inscriptions in Greek and Arabic. The Darius tablets were translated by Sir Henry Rawlinson, whose account of his work is given in the *Journal of the Royal Asiatic Society*.

Behm, DR. ERNST, geographer, was born in 1830, at Gotha. At first chief assistant in the editorship of the *Mittheilungen*, a geographical periodical, he became, in 1878, editor himself on Dr. Petermann's death. He also commenced in 1872 a statistical supplement to the *Mittheilungen*, and in 1876 became the statistician for the *Almanach de Gotha*. He died in 1884 in his native town.

Behn, APHRA, writer of plays and novels, was born in 1640 in Wye, Kent, her maiden name being Johnson. While still a child she went to Surinam, where she became acquainted with Oroonoko, a slave, whom she introduced subsequently as the subject of one of her novels. On returning to England, about 1658, she married a London merchant, being left a widow in less than ten years. She became a favourite with Charles II., and he sent her on a mission to Antwerp. She then became a figure in the gay society of the time, and was a prolific author of plays, poems, and novels, which, though much praised at the time, are chiefly remarkable for their impurity. She died in 1689, and was buried in Westminster Abbey.

Behring, or BERING, VITUS, a celebrated navigator, was born in 1680 at Horsens, in Jutland, and, having entered the Russian service under Peter the Great, discovered, in 1728, the Strait, since called after him, that divides Asia from America. In the course of a second voyage, undertaken for the further examination of the N.W. coast of America as far north as lat. 69°, he was wrecked on Behring Island, one of the Aleutian Islands, and died there on December 8th, 1741.

Behring's Strait, named after Vitus Behring, who discovered it, is the channel that separates Asia from America, and connects the Pacific and Arctic oceans. Previous to Behring's expedition in 1728, Asia and America were supposed to be united. The strait was more fully explored by Cook in 1778.

Beilan is the name of a town and a pass in the N. of Syria, and on the E. side of the Gulf of Iscanderoon. It is the ordinary route between Syria and Cilicia. Through it Alexander the Great marched, and the Crusaders, and in 1832 it was the scene of a conflict between Egyptians and Turks.

Beira, a province of Portugal, with Spain on the E. and the Atlantic on the W., and watered partly by the Douro in the N. and partly by the Tagus in the S. Besides cattle, sheep, and pigs, it produces wine, grain, fruits, etc. Prior to the revolution in 1910, the heir-apparent to the Portuguese throne always bore the title Prince of Beira.

Beisa Antelope. [ORYX.]

Beja, an eastern branch of the Hamitic race [HAMITES], occupying nearly the whole of the steppe lands between Upper Egypt and Abyssinia, and extending from the Middle Nile E. to the Red Sea. The Bejas are an historic people, the true aborigines of East Nubia, probably the Begas of early Arab writers (tenth century), the Bugas of Greek and Axumite (Abyssinian) inscriptions (fourth century), and the Buka of the hieroglyphic records. They are the Magabari and Blemmyes of Strabo (book xvii.), who for centuries harassed the southern frontiers of Egypt, but who were brought under Mohammedan influences soon after the Moslem invasion of the Nile valley (seventh century). All are now Mohammedans; many of their chiefs even claim Arab descent, and some toward Upper Egypt speak Arabic. But the bulk of the nation still retain their primitive Hamitic tongue (To-Bedawiye), which is akin on the one hand to the old Egyptian, on the other to the Dankali, Somal and Galla idioms, south of Abyssinia. They are divided into a great number of tribes, some of which have been several times in collision with the English forces since the British occupation of Sawâkin (Suakin) in their territory on the Red Sea coast. The chief tribal divisions are:—1. The *Abâbdeh* about the frontier of Upper Egypt, largely assimilated to the Arab Bedouins. 2. The *Bishâri* (Bishâriab), the Shari of the hieroglyphics, Egbai district, south of the Ababdeh, and generally between Sawâkin and the Nile; include the Hadâreb, Heljab, Mansurab, Amrar, and several other septs. 3. The *Taqa*, of the Khor-Baraka valley, and generally from the Bishâri, south to Abyssinia; include the powerful Hadendâwas, Halenkas, Homrâns, and Beni-Amers. Several of the Arabised Senaar tribes, such as the Sukurieh, Kabâbish, Jâlin and Bagâra, appear to be also of Beja stock. The Bejas, already described by Herodotus as "the tallest and finest of men" (book iii.), are physically a magnificent race, with well-shaped muscular frames, regular features, and long black kinky hair, on the dressing of which extraordinary care is bestowed. They are an exceedingly brave, freedom-loving people, chiefly engaged in camel-breeding and as caravan leaders between the Nile and the Red Sea. See Burckhardt's *Travels in Nubia* (1822); J. Russiger's *Reise in Egypten, und Ost. Sudan* (1843-44); Col. Grant's *Route March from Berber to Korosko* (1863); A. H. Keane's *Ethnology of Egyptian Sudan* (1884).

Bejar, a Spanish town, fortified, is 45 miles S. of Salamanca, in the valley of Sierra de Bejar. It has an annual fair, a hot sulphur spring, and manufactures cloth.

Bek, ANTONY, a Bishop of Durham in the time of Edward I. He died in 1311. Also the name of a Bishop of Norwich, who died in 1343.

Bek, THOMAS, a Bishop of St. David's, died 1293. Also the name of a Bishop of Lincoln, who died in 1347.

Beke, CHARLES TILSTONE, traveller, was born in London in 1800. He studied law at first, but abandoned it for historical and geographical pursuits. In 1834 he published his *Researches in Primeval History*, which drew forth much opposition on the ground of its hostility to the inspired record of the creation in Genesis. For this he received the degree of Ph.D. from the university of Tübingen. In 1840 he went to Abyssinia, and published the results of his explorations in 1846. Besides an attempt to explore the Upper Nile and another journey to Abyssinia, he also, in the year of his death, 1874, set out for Palestine to determine the exact position of Mount Sinai. In addition to his contributions to the *Transactions* of learned societies and works on Abyssinia and the Nile, he also edited for the Hakluyt Society De Vere's *Three Voyages towards China.*

Bekes, a Hungarian market town, and the capital of the county of the same name, is chiefly inhabited by Calvinists, and does a trade in cattle, corn, and honey. It is situated at the junction of the Black and White Körös.

Bekker, IMMANUEL, philologist, was born in 1785 at Berlin, where in 1810 he obtained a professorship in the university. Among the works he edited are comprised Plato (10 vols.), *Oratores Attici* (7 vols.), Aristotle, Thucydides, Aristophanes (3 vols.), Livy, Tacitus, and 24 volumes of the Byzantine historians. He died in 1871.

Bel and the Dragon, one of the books of the APOCRYPHA (q.v.), forming part of the Greek version of the book of Daniel, but not found in Hebrew or Chaldee. It describes in very naïve language how Daniel's success in combating idolatry caused him to be cast into the den of lions. Jerome considered it a fable, but it is recognised by the Roman and Anglican churches, and formed part of the Lectionary of the latter till 1871.

Belcher, SIR EDWARD, navigator and explorer, was born in 1799, and entered the Royal Navy in 1812. He was present in the *Superb* at the bombardment of Algiers in 1816, and received his lieutenant's commission in 1818. In 1825-28 he accompanied Beechey to Behring Strait, and in 1829 became a commander. From 1836 to 1842 he was employed on surveying duties in the *Sulphur*, in which he made the voyage round the world, and also took part in the operations in China. In 1841 he attained post-rank, and in 1843, while he was surveying in the East Indies, he was knighted. In 1852-53 he commanded the *Assistance* in one of the Franklin search expeditions. He became a rear-admiral in 1861, and a vice-admiral in 1866, and died an admiral and K.C.B. in 1877. Among his works are *Narrative of a Voyage Round the World*, 1843; *A Treatise on Nautical Surveying; The Voyage of the Samarang*, 1848; *The Last of the Arctic Voyages*, 1855; and *The Great Equatorial Current*, 1871.

Belemnitidæ is one of the three families of that section of the ten-armed CEPHALOPODA, known as the PHRAGMOPHORA owing to the possession of a "phragmocone." This structure consists of a series of septa or partitions slightly separated from one another, but communicating by a narrow tube known as the siphuncle. (This should be compared with the structure of a NAUTILUS shell.) In the forms with the simplest shells the phragmocone consists simply of a series of septa with the chambers between them closed in at the sides by a thin calcareous wall; in the Belemnites it is enclosed in a cavity (alveolus) at one end of a dense, long, and usually conical shield, known as the "guard." At the alveolar end the guard is continued as a horny tube (the proöstracum). Like the squid they possessed an ink sac. The family is extinct; the principal genus was *Belemnites*, which was common throughout the Mesozoic (q.v.) era; a few species occurred earlier and a few survived till later. The "guards" of *Belemnites*, owing to their indestructibility are very common as fossils, and have long been known as "thunderbolts." Other important genera are *Aulacoceras*, an early form found in the Tyrol, and *Spirulirostra* from the Miocene, in both of which the guard is small in comparison with the phragmocone.

Belemnoteuthidæ, a second family of the PHRAGMOPHORA (for terms *see* BELEMNITIDÆ), in which the "guard" is reduced to a thin shelly layer surrounding the "phragmocone." The principal genus is *Belemnoteuthis*, of which some specimens from the Oxford clay have preserved traces of the soft parts, and thus have done much to elucidate the structure of the family and its allies. The family is extinct, and lived only in the Trias and Jurassic periods.

Belfast, the chief commercial and manufacturing centre in Ireland, is on the Lagan, which flows into Belfast Lough, and which is here spanned by several bridges. It is the capital of Ulster, and the county town of Antrim, and in 1888 was raised to the rank of a city. The area of the borough is in round figures 16,500 acres. Built mostly of brick, it has also wide and regular streets, chief among which is the Royal Avenue, a splendid thoroughfare leading through the centre of the town, and containing besides many elegant shops, the post-office, the Ulster reform club, and the free library. Other of its chief public buildings are the town hall, the county court, the commercial buildings and exchange, a new city hall erected on the site of the old white linen hall, the Albert memorial clock tower, theatre, etc. For recreation it has seven parks. Its chief industries are the manufacture of linen and shipbuilding, after which come flour-mills, rope-making, distilling, the manufacture of aërated water, etc. For its extensive commerce

it has commodious harbours and docks, between one and two millions having been expended upon their improvement during recent years. Besides trading with British ports, its ships sail to America and the chief ports on the Continent. The prevailing religious denomination is the Presbyterian. By the Irish Universities Act of 1908, a Royal Charter was issued for the foundation of the Queen's University of Belfast. Other leading educational establishments are Campbell, Presbyterian, Methodist, St. Malachy's, Royal Academy, Academical Institution, and Victoria Colleges, besides private schools and 280 national schools. It has been the scene of frequent faction fights between the Catholics and Protestants, notably in the years 1864, 1872, 1880, 1886, and 1909. Pop. (1901), 348,965.

Belfort, a fortified French town and capital of the department of Upper Rhine, on the Savoureuse, offered a stout resistance to the German forces in 1870, capitulating with the sanction of the government, and only after a three months' siege. From 1871 to 1879 that part of the Haut-Rhin department remaining in French possession was named the "territory of Belfort" after the town; the name Haut-Rhin, however, has now again been restored. Its citadel is by Vauban. It has also a fine church, a college, a public library, and various manufactures.

Belfry (French *beffroi*) is said to be derived not from bell, but from old German words meaning a sheltered place. First applied to a kind of movable tower used in sieges, it was then transferred to a watch tower or alarm bell tower, and then to any tower containing a bell. In Italy (where the name is *campanile*) church belfries stand detached from the church; and so occasionally in England, as at Beccles in Suffolk, Evesham, and along the Welsh border. Often in England, however, it is reduced to a mere turret or bell-cote placed on the west end of the church. On the Continent belfries are frequently secular, and attached to municipal buildings. The famous belfry of Bruges, commenced 1291, is of this class. It is 353 feet high, and contains a carillon of forty-eight bells.

Belgæ, the inhabitants, according to Julius Cæsar, of one of the three great divisions of Gaul; they extended from the Rhine to the ocean, their S. boundary being the Seine and Marne, which separated them from the Celtæ or Gauls. Cæsar and his informants held them to be of German origin, but modern writers are of opinion that this was true of only some portions of them, and that in the main they were Celtic. The name was undoubtedly a collective name for a group of tribes. Belgæ were also found settled by Cæsar in Kent and Surrey, and Ptolemy locates a population of that name in the modern Wiltshire, but the relation of these latter to the continental Belgæ is obscure.

Belgaum, a city and district of British India, Bombay presidency. The city, which is situated 55 miles N.E. of Goa, is on a plain 2,500 feet above sea-level. It was captured by the British in 1818 and made a permanent military station

Belgiojoso, a town of Northern Italy, situated between the Po and the Olona, has an old castle. The Princess Cristina of Belgiojoso, born 1808, died 1871, was an enthusiast in the cause of Italian liberty.

Belgium, a country of W. Europe, bounded on the N. by the North Sea and Holland, on the E. by Prussia and Luxemburg, and on the S.W. by France. The name is derived from the *Belgæ*, a Celtic-speaking race who once inhabited the whole region W. of the Rhine known to the Romans as Gallia Belgica, of which the Belgium of to-day is only a fraction. This is among the smallest of the European states, its area being only 11,373 square miles,

MAP OF BELGIUM.

or about one-eighth of that of Great Britain. Its greatest length (N.W. to S.E.) is 174 miles, and its greatest breadth 105 miles. The general aspect of the country is level, presenting few natural features of particular importance. The highest hill, Baraque Michel, is 2,230 feet, but the mean elevation of Belgium is not more than 536 feet. Belgium is remarkably well watered, the principal *rivers* being the Maas, or Meuse, of which 115 miles are Belgian, and the Scheldt, or Escaut, with 108 miles in Belgium, both navigable throughout; the Yzer is navigable for about 26 miles; the Lesse, one of the tributaries of the Meuse, traverses in its course the beautiful stalactite grotto of Han, nearly a mile in length. The country W. of the Meuse and its tributary the Sambre is low, flat, and fertile, but the region at the foot of the Ardennes, in the E., is much less productive. Mineral springs are found in several districts; the most celebrated are those of Spa, Chaudefontaine, and Tongres.

History. The Belgium of to-day can scarcely be said to have a history, since it dates only from 1831. Prior to the revolution which preceded (in September, 1830) its establishment on its present basis, the country formed a part of the Netherlands, and shared with what is now Holland the vicissitudes of many wars, failing, however, to shake off the Spanish yoke with the Dutch Republic. [*See under* HOLLAND.] The Austrian Netherlands, as they then came to be called, acknowledged the supremacy of the House of Hapsburg until the all-devouring empire of the first Napoleon reduced them to French provinces. On his fall the Netherlands were once more united as a kingdom under the sceptre of William of Orange-Nassau, son of the last Stadtholder of the Seven United Provinces. The revolution of 1830 put an end to this union, and a "National Congress" in the following year elected Prince Leopold of Saxe-Coburg Gotha as king of the Belgians. On his death, in 1865, his son succeeded him as Leopold II. Leopold died in December, 1909, his nephew, Albert, succeeding him. Owing to its geographical situation, Belgium has been the theatre of many campaigns in which politically it had little concern. The number of its battle-fields has acquired for it the unenviable title of "the cock-pit of Europe." The campaigns of Marlborough, with the battles of Ramillies (1706) and Oudenarde (1708), and Wellington's victories of Quatre Bras and Waterloo (1815), may be cited as the most familiar examples.

The Constitution, as fixed by the law of 1831, provides for a king, a senate, and a Chamber of Representatives. The last-named is elected by all citizens over 25 years of age, who, domiciled for not less than one year in the same commune and not legally disqualified, have votes. Universal male suffrage was introduced in 1894, and proportional representation in 1900. The maximum number of members is in the proportion of one to every 40,000 of the population; the actual number in 1909 was 166. The Senate consists of members elected for eight years, and the number of senators is 111. The chief ministers are (1) President of the Council, Minister of Interior and of Agriculture, and the Ministers of (2) Science and Art, (3) Finance, (4) Public Works, (5) Foreign Affairs, (6) Justice, (7) War, (8) Colonies, (9) Industry and Labour, (10) Railways, Posts, and Telegraphs.

Population.—In 1907 this was 7,317,561, or an average of 629 to the square mile. Belgium has long been the most thickly peopled country of Europe. Even in the sixteenth century Philip II. of Spain is said to have exclaimed, on passing through it, "This is only one great town." As the population is at present increasing annually at the rate of about 1½ per cent., there seems a reasonable prospect of Philip's description becoming literally accurate before very long. Emigration is a little more than counterbalanced by immigration. Belgium's lack of colonies helps no doubt to keep down the number of emigrants. The Congo State is not likely to afford much additional outlet for the surplus population.

Religion.—The constitution provides for full religious liberty, but as a matter of fact nearly all the inhabitants are members of the Roman Catholic Church. There are about 27,000 Protestants and 13,000 Jews. The country is divided into six dioceses, the Archbishopric of Mechlin (Malines), and the Bishoprics of Bruges, Ghent, Liége, Namur, and Tournay. There are 6,239 Roman Catholic churches.

Education. There is a system of schools, supported partly by the State and partly by the locality in which they are situated; but the results, as apparent in recruiting returns and other similar statistics, are not altogether satisfactory. A considerable percentage of the population can still neither read nor write. There are four universities, at Ghent, Liège, Brussels (free), and Louvain, with a total of over 5,000 students, besides a famous academy of fine arts at Antwerp, with some 1,000 students, and conservatoires of music at Brussels, Ghent, and Louvain, with an aggregate of about 15,000 students. The universities have special technical schools attached to them, and there are schools of design attended by some 13,000 students.

Agriculture. Owing to the density of the population in proportion to the limited area, Belgium is forced to depend largely for its maintenance on foreign imports. To the same cause may also be attributed, in part at least, the tendency to extreme subdivision of the land which is a marked characteristic of its agriculture. Belgium is emphatically a country of small holdings, there being about a million of landed proprietors, of whom only 16,000 hold more than 20 hectares, while 544,000 are possessors of less than one "hectare" (about 2½ acres). By these, however, the land is assiduously cultivated, and a very high reputation for farming has been established. In the low-lying districts near the mouth of the Scheldt, large tracts of land, called "polders," have been protected by substantial dykes, as in Holland, from the inroads of the sea, and drained by a network of canals, some of which are above the general level of the soil, and are fed by pumping. Nearly 200 square miles of what would otherwise be waste land have thus been brought under cultivation; in some parts the loose sand-dunes have been planted with the sand-reed (*Arundo arenaria*), which in the course of centuries has formed a vegetable soil, and now supports extensive fur plantations. About 65 per cent. of the total area is at present cultivated; 23 per cent. consists of pasture and meadow lands, and 17 per cent. of forest. The principal crops are wheat, rye, barley, oats, and red clover; beetroot, potatoes, carrots, and turnips are also largely grown, and the last three are exported in considerable quantities; flax has for centuries been an important article of cultivation and export.

Mineral Products and Industries.—Belgium is rich in minerals, which constitute one of its chief sources of national prosperity. Of pig and manufactured iron, between one and two million tons are produced annually; of steel ingots there are more than a million and a quarter, and over a million of manufactured steel. The production of pig iron employs some four thousand men, and sixteen thousand are engaged in the manufactured

iron trade. Lead and zinc are wrought to some extent in Liége; copper in Liége and Hainault; slates at Herbeumont; black marble at Dinant; and calamine chiefly at Liége.

Coal exists in great abundance. The seams in some districts do not lie horizontally, as in England, but are nearly vertical, so that mining has to be carried on almost entirely by means of shafts, instead of the level galleries in use in England. These shafts or pits are driven constantly deeper as the coal is got out, until the limit of practical mining is reached. There are 219 coal-mines in Belgium, of which 122 were working in 1906. The output in 1906 was 23,569,000 tons, and the estimated value £12,000,000. Nearly 4½ million tons were exported. On the other hand, about one million tons were imported during the same period. In coal mining upwards of 139,000 persons were engaged in 1906. There is a special department of Industry and Labour. Belgium has also a Superior Council of Industry, a Council of Mines, and a Council of Specialists for advising the State as to the interests of various industries.

Manufactures. Fire-arms are made in great numbers. Liége is the centre of this industry, and contains the Royal Gun Factory, the State Cannon Foundry, and the State Proof-House. Machinery is produced chiefly at Seraing, an industrial centre in which the prosperity dates from the foundation of a factory by John Cockerill in 1817; it has been called the Birmingham of the Continent. Woollen goods are made chiefly at Verviers and Liége; carpets at Brussels and Tournay; linen in Flanders, Brabant, and Hainault; lace at Brussels, Mechlin, and Bruges; cotton at Ghent; glass at Charleroi; hosiery at Tournay. Beet-sugar manufacture is an active industry, there being 99 refineries at work in 1906; the production amounted to over 124,000 tons of raw sugar.

Shipping.—The principal seaports are Antwerp, Ostend, and Nieuport. Ghent, although situated inland, has a large shipping trade, the canals giving free access to ships up to 2,000 tons burthen.

RETURN OF SHIPPING DURING THE YEAR 1908.

Number of Foreign vessels entered and cleared at Belgian ports.	Total Tonnage.
20,500	26,859,000

Commerce.—Its position gives Belgium great importance as an *entrepôt*. The amount of produce passing through its ports is therefore somewhat in excess of its own requirements and productions.

The *imports* of Belgium during 1908 were by sea, 2,565,000,000 francs; by land, 2,781,200,000 francs. The following were the principal articles: Grain of all kinds; flour, chiefly from the United States; hemp, jute, and cotton, mostly from England and India; hides, from the River Plate; ivory, from the Congo; wool, from South America; nitrates; petroleum; rice, mainly from British Burmah; coffee, from Brazil; timber, from the Baltic; coal, from England.

Of *exports* the most important were:—Yarns, machinery, etc., raw textiles, coal, cereals, and vegetable substances. The total value is estimated at 4,527,400,000 francs for 1908, somewhat less than the previous year.

Communications.—The roads are mostly very good; length (in 1908), 6,000 miles. Canals are more numerous than in any other country except Holland; navigable waters extend to 1 360 miles. In January, 1908, there were 2,860 miles of railway open, of which about three-fourths were worked by the State. There are 4,520 miles of telegraph lines, with over 24,000 miles of wires, and 1,560 telegraph stations. Post offices number 1,485, and the private letters carried in 1908 numbered over 182,500,000, besides a nearly equal number of newspapers and large quantities of other documents.

The *Army* was, up to 1909, raised by conscription, all able-bodied males being liable from the age of nineteen. In December of that year an Act was passed substituting "personal service" for conscription and substituted service. Under the new rule only "one son per family" is liable for service. The term of service is, at present, eight years, of which about two thirds are usually spent on furlough. The duration of service is expected to be altered at an early date. The full peace-strength of the Belgian Army is rather over 43,000, and the number of men available in the event of war is 180,000. The present strength, however, does not attain this maximum. There are 4 divisions in the field army, each of about 22,000, and there are 2 cavalry divisions of 2,000 each.

The following table gives the peace establishment in 1909:—

Branch.	Officers.	Men.	Total.
Infantry - - -	1,740	26,000	27,740
Cavalry - - -	300	5,372	5,672
Artillery - - -	545	7,300	7, 45
Engineers - - -	165	1,550	1,715
Administrative -	270	465	735
Others - - -	420	2,100	2 520
Total - - -	3,440	42,787	46,227

The Belgian Army uses the Mauser rifle. The field artillery is equipped with 7·5 Krupp quick-firers. The gendarmerie numbers about 3,430, of which some 2,000 are mounted, which is to a certain extent incorporated in the army. The Garde Civique numbers about 46,500.

Arts. No country, Italy perhaps excepted, is richer in examples of the very highest art. It is impossible within the limits at disposal even to mention more than a few of the most prominent. The cathedrals of Brussels and Antwerp, the belfries of Tournay, Ghent, and Bruges, and the town halls (*hôtels de ville*) of Bruges, Brussels, and Louvain, are perhaps the most world-renowned of the many admirable specimens of Belgian architecture.

The Flemish school is among the most celebrated in the history of painting, and Belgium is, of course, rich in examples, from the period of the Van Eycks at Bruges in the fourteenth century, onward. Memling, Quentin Matsys, Mabuse, Rubens, Snyders, Van Dyck, Teniers, and many other masters, inferior only to these, may yet be studied in the localities, and among most of the surroundings which they loved to depict.

Music has long been appreciatively studied in Belgium, and many of her sons have achieved a wide reputation. Of violinists, in particular, there is an excellent record. Joseph Ghys (1801-1848), and Hubert Léonard (1819-1890) are names well known and highly respected among students of modern music, and they have worthy successors among the living masters.

The *inhabitants* of Belgium form two sharply defined ethnical groups, the *Flemings* and *Wallons* or *Walloons*, distinct in origin, speech, traditions, and geographical position, but united by a common nationality and religion. Nearly all are Roman Catholics; but the Flemings, who call themselves *duytsch* or *neder-duytsch*, are of Teutonic stock, a branch of the Low German division, and speak a Low German idiom, essentially the same as the Dutch of the Netherlands, whereas the Wallons are of mixed Gallo-Roman descent and speak a Romance (Neo-Latin) tongue in two varieties (Hennuyer and Liègeois), closely allied to the French dialects of Picardy and Lorraine. The two groups are about equal in numbers (3,100,000 of Flemish, 2,900,000 of Romance speech), and also occupy nearly equal portions of the kingdom: Flemings mainly in the west (both Flanders, two-thirds of Brabant, Antwerp, and Limbourg, with area 5,000 square miles), Wallons mainly in the east (Hainault, Namur, Liège, Luxembourg, and one-third of Brabant, with area over 6,000 square miles). Many are bilingual, especially in the towns, and the capital, though situated in the Flemish domain, is largely French in speech. French is also the language of the Court, of diplomacy, the higher circles, general literature and intercourse, hence it seems destined to ultimately supersede both Flemish and Wallon as the exclusive language of the country. In late years, however, there has been a "Flemish revival," and Flemish is now largely used in literature, and even in scientific works and periodicals, such as the *Bulletin de l'Académie Royale de Belgique*. On the other hand, Wallon, being little cultivated, has sunk to the position of a provincial *patois*. Distinctions have been drawn, and sometimes perhaps overdrawn, between the mental qualities of the two groups. Both are equally frugal and industrious, but while the Wallons are more lively they are less solid than the Flemings, who have also been most distinguished in science, and especially in art. Antwerp, Flanders, and Flemish Brabant are the true seats of Belgian painting, architecture and wood carving, and the Flemish towns are incomparably more interesting than those of the Wallon territory. But the Wallons, who may be regarded as the true representatives of the ancient *Belgæ*, are physically the finer of the two races, stronger, more bony and taller, also more long-lived and less subject to disease, as shown by the lower death-rate in Namur (18 per 1,000) than in West Flanders (25 per 1,000).

Belgorod, also BIELGOROD, a town of Russia upwards of 400 miles S. of Moscow, is on the Donetz. It is the seat of an archbishop's see, has numerous churches, manufactures in leather, etc.

Belgrade, the capital of Servia, is situated at the confluence of the Save and Danube, and on the right bank of the latter. It is identified with the ancient *Singidunum* of Ptolemy. From its position as being the key to Hungary it was long the scene of many fierce conflicts between the Austrians and the Turks, and repeatedly changed hands —from the Greeks in 1073 to the Hungarians, back again to the Greeks, and from them to the Bulgarians, Bosnians, and Servians respectively. In 1456 and again in 1522 it was stormed by the Turks, who held it until 1688, when it was retaken by the Austrians, who again lost it in 1690. In 1717 Prince Eugène, the ruins of whose palace still remain, took it, and after an attempt on the part of the Turks to carry it by storm in 1739, it came into their hands by treaty. In 1789 Austria again acquired it; in 1791, Turkey; in 1806, Servian insurgents; in 1862 it was bombarded from its own citadel, which remained in Turkish hands until 1867. By the treaty of Berlin, 1878, it was made the capital of an independent state. Though it has in the main belonged to Turkey, it has yet more the appearance of a European than a Turkish town. It has a royal and an episcopal palace, a cathedral, a theatre, and other public and educational buildings. Carpets, hardware, cutlery, etc., are manufactured, and it has a considerable trade.

Belgravia, the specially fashionable district of London immediately S. of Hyde Park Corner, and about Eaton and Belgrave Squares. It derives its name from the latter, which in its turn is called after one of the subordinate titles of the Duke of Westminster, the ground landlord of the district.

Belial is a Hebrew word meaning worthlessness, wickedness. Translators have treated it as the name of a person, as in the phrases, "son of Belial," "man of Belial."

Belief, a term variously used by philosophers to denote either a state of mind with respect to certain propositions, or the propositions themselves. Usually it means assent on insufficient evidence and is contrasted with knowledge, that term being sometimes restricted to propositions of which the contradictory is inconceivable, *i.e.* necessary truths like the propositions of arithmetic or geometry. But some intuitionist psychologists regard all our knowledge as based on certain principles involved in the structure of our mind and not based on experience, which they term fundamental, or primary beliefs. In religion the term is used as almost a synonym for faith, *i.e.* assent (largely coloured with emotion) to propositions, the evidence for which falls short of logical proof. The doctrine of the culpability of

wrong belief in religious matters is based on the view that "all assent involves an act of will," a mediæval theory which receives some support from current psychology.

Belisarius, in Slavonic, *Beli-tzar*, meaning *White Prince*, flourished in the reign of the Emperor Justinian. He was born in Illyria about 505 A.D., and died in 565. In 530, while in command of the eastern army of the empire, he won a brilliant victory over a Persian army twice as numerous as his own. Next year, however, at Callinicum on the Euphrates, the Persians defeated him and he was recalled. In 532 he checked the factious fighting in Constantinople between the Green and the Blue parties, who at that time were endangering the supremacy of Justinian. He was thereafter in 533 sent with an army into Africa against the Vandals, whose king, Gelimer, he made prisoner, and led in triumph through Constantinople. He was next engaged in Italy against the Goths, whose king, Vitiges, he also captured in 540 at Ravenna. Summoned to Constantinople by the emperor, he was again engaged against the Persians in 541–42, after which he had to return to Italy in consequence of the invasion of Totila. Though inadequately supplied with forces he yet sustained a struggle against the barbarians for five years. In the end, however, his repeated requests for additional aid being disregarded, he was replaced in the command (in 548) by Narses, his rival, distinguishing himself once more in 559 in a campaign against the Bulgarians. In 563 he was imprisoned through a slanderous charge of conspiracy against Justinian, whom he had served so well; but the emperor becoming convinced of his innocence soon afterwards, set him free and restored him to his dignities. According to another but not so authentic account, Belisarius was deprived of his eyesight and reduced to beggary. He had the misfortune to be mated with a profligate wife Antonina, a companion of the Empress Theodora.

Belize, the capital of British Honduras, which also bears the same name, is situated on the river Belize. It is the only trading port of British Honduras, and from it are exported mahogany, logwood, rosewood, sarsaparilla, indiarubber, etc., the produce of the colony.

Bell. Bells are made of various materials—glass, silver, and recently steel—but that most usually employed is bronze or bell-metal (q.v.), a mixture of copper and tin. Some early Irish bells are made of riveted plates, but all but an infinitesimal proportion are cast. Their use is certainly very ancient. Small bells are found at Nineveh, and golden bells formed part of Aaron's vestments. (Exod. xxviii. 33, 34.) Some form of bell was used by the Greeks in fortified towns. Greek and Roman bells were very variously shaped, some forms resembling our own. Sets of bells were attached to frames and carried in the hand (apparently) in certain religious processions; bells were attached to the collars of chariot-horses; and gongs of bell-metal are preserved in the Naples Museum. In Christian worship the use of bells dates probably from about the fifth century. It is mentioned by Bede, and by Gregory of Tours. They are or have been used to summon to church; to signify the approaching death of a member of the congregation (the "passing bell"), a practice revived in some places of late years, here and there, by the Anglican Church; during a thunderstorm to keep off the lightning (a practice still customary in parts of the Tyrol, and elsewhere on the Continent); to

GREAT BELL OF MOSCOW.

call to prayer (ANGELUS); and at the elevation of the host in Catholic worship. Before a funeral, in the Anglican Church, a bell is tolled; after it a peal of bells is often rung in the country, though less commonly in towns, for obvious reasons. The bell rung at the elevation of the host is commonly a hand-bell; sometimes (in England before the Reformation) it was a small bell hung among the rest in the tower, or alone just above the chancel. Church bells commonly bear pious inscriptions, and have often been dedicated or "baptised" with religious ceremonies. The curfew bell was originally rung in pursuance of a statute ascribed to William the Conqueror, ordering all fires to be put out at 8 p.m. The practice was abolished by Henry II., but the "curfew" is still rung at dusk in many places. In some places on the Continent—especially at Antwerp cathedral and Bruges—elaborate music is performed by sets of bells. (CARILLON.) For the ringing of bells *see* CHANGE-RINGING. The principal bell-foundries are those of Loughborough in England (where Great Paul was cast) and Louvain in Belgium.

Remarkable bells. The earliest bells were mere hand bells; and really large specimens hardly occur before the fifteenth century of our era. The famous Great Bell of Moscow, now converted into a sort of chapel, is 60 feet round and 19 feet high, and is said to weigh 198 tons. It was spoilt in casting, was in the earth 136 years, and set up in its present position by Nicholas I. The

largest bell in use, also in Moscow, is said to weigh 128 tons. The Kaiserglocke of Cologne Cathedral (1874), made from cannon captured in the Franco-German war, weighs a little over 26½ tons. Another in the same cathedral, cast in 1447, weighs 11 tons. Big Ben in the Clock Tower at Westminster (cast 1858) weighs 13 tons; it was cracked in the casting, but the effect was cured by the crack being filed open; Great Tom, at Christ Church, Oxford, cast 1680, 7⅞ tons; "Great Paul," at St. Paul's Cathedral, London, cast 1881, 17½ tons.

Bell, ANDREW, was born in 1753 at St. Andrews, where also he was educated. Taking orders in the Church of England, he went to India, and in 1789 became manager of the institution for the education of the orphan children of European soldiers at Madras. Here, through the lack of properly qualified assistants, he had to fall back upon the scholars themselves for aid, in which expedient originated the Madras or monitorial system of education. His health failing he was pensioned off by the East India Company in 1797, and having returned to England he in the same year published a work on his system. Through its adoption by Joseph Lancaster, a Quaker, it obtained considerable public recognition, and Lancasterian schools spread over the country. This alarmed the Church party, which in 1811 founded the National Society for the Education of the Poor, with Bell as superintendent. After a visit to the Continent in furtherance of his system he was appointed prebendary of Hereford and of Westminster. Dying in 1832, he apportioned £120,000 of his fortune for educational purposes.

Bell, SIR CHARLES, surgeon, was born 1774 in Edinburgh, where he studied anatomy under his brother John (q.v.). In 1804, after being admitted a member of the Edinburgh College of Surgeons, he removed to London and made a name as a lecturer on anatomical and surgical subjects. In 1807 he discovered the dual character of the nerves of the brain, sensory and motor. This was published in his *Anatomy of the Brain* in 1811, and amplified in his *Nervous System* (1830). Meanwhile (in 1814) he had been appointed surgeon to the Middlesex Hospital, in 1824 to the chair of anatomy and surgery to the Royal College of Surgeons, London, and in 1836 to the professorship of surgery in the University of Edinburgh. In 1829 for his scientific discoveries he was awarded the Royal Society's medal and knighted by William IV. in 1831. He also gave special study to gunshot wounds. Besides numerous treatises on the nervous system, he also in conjunction with Lord Brougham edited Paley's *Evidences of Natural Religion*. He died in 1842 at Worcester.

Bell, GEORGE JOSEPH, brother of Sir Charles, was born in 1770 in Edinburgh. He became distinguished in law, and in 1822 was appointed professor of Scots Law in Edinburgh University. In 1832 he became one of the clerks of the Court of Session, and in 1833 chairman of the Royal Commission on Law. He wrote several legal books, the chief being *Principles of the Law of Scotland*, 1829. He died in 1843.

Bell, HENRY, was born in 1767 in Linlithgowshire. After serving successively as a stonemason, a millwright, and in a ship-building yard, he settled in Helensburgh in 1807, where he gave his attention to the steamboat, and in 1812 the *Comet*, which had been built under Bell's directions, was launched. It was driven by a three-horse power engine made by himself, and was the first European steamer. He is also said to have invented the discharging machine used in calico-printing. He died at Helensburgh in 1830.

Bell, HENRY GLASSFORD, lawyer, was born in 1803 in Glasgow. He studied law at Edinburgh, where he founded and edited in 1828 the *Edinburgh Literary Journal*. Passing as an advocate in 1832, he received the appointment of sheriff-substitute for Lanarkshire in 1839, succeeding as sheriff in 1867. He wrote a vindication of Mary Queen of Scots and several volumes of poetry. He died in 1874.

Bell, JOHN, traveller, was born in 1691 in Stirlingshire. After studying medicine he went in 1714 to St. Petersburg, and received the appointment of physician to an embassy for Persia. This was followed by similar appointments to different parts, the result of these travels being published in 1764. He died in 1780.

Bell, JOHN, surgeon, was born in 1763 in Edinburgh, where he commenced his career as a lecturer on surgery and midwifery. These lectures brought him into notice. His chief works are his *Anatomy*, a book on wounds, and his *Principles of Surgery*, of which an enlarged edition was brought out by his brother, Sir Charles (q.v.), in 1826. He died at Rome, whither he had gone for the sake of his health, in 1820.

Bell, JOHN, was born in 1797 in Tennessee. A barrister, he became in 1827 a member of Congress, in 1834 Speaker, and in 1841 Secretary for War. In 1847 he withdrew to the Senate, and in 1860 was nominated for the Presidency. He was not returned, however, and retired from active political life, dying in 1869.

Bell, ROBERT, journalist, was born in 1800 at Cork. Removing to London in 1828, he became editor of the *Atlas*, *Monthly Chronicle*, *Mirror*, and *Home News*. He wrote for Lardner's *Cabinet Cyclopædia*, completed Southey's *Naval History*, and Mackintosh's *History of England*, and several plays and novels. His annotated edition of the *British Poets from Chaucer to Cowper* is his best known work. He died in 1867 in London.

Bell, THOMAS, naturalist, was born in 1792 at Poole, Dorsetshire. After studying at Guy's Hospital and holding the position of dental surgeon there, he in 1836 became professor of zoology in King's College, London. During the years 1840–53 he acted as secretary to the Royal Society, in 1844 first president of the Ray Society, and 1853–61 was president of the Linnæan Society. His best known books are on *British Quadrupeds*, *British Reptiles*, *British Stalk-eyed Crustacea*, and his White's *Natural History of Selborne*. He died at Selborne in 1880.

Bell, BOOK, AND CANDLE (CURSING BY), the popular name for excommunication from the ceremonies used. The "book" was that from which the sentence was read; the candle was kept burning during the reading and extinguished at its close, as a sign that the sinner's light in the Church was extinguished unless he should repent; the bell was rung to announce what was going on. Similar ceremonies were used in exorcism, with, of course, a different meaning.

Bella, STEFANO DELLA, engraver, was born in 1610 at Florence. Going to Paris in 1642 he was employed there by Richelieu, and on returning to Florence he became teacher in drawing to Cosmo de' Medici. He engraved more than 1,000 plates.

Belladonna, the Deadly Nightshade (q.v.), *Atropa Belladonna.* [ATROPINI.] Its active principle Atropine produces, in small doses, dryness of the mouth and headache. After poisonous doses the pupils become widely dilated, the pulse rapid, the skin is covered with a scarlatiniform rash, and a restless delirium supervenes. Belladonna poisoning occasionally occurs in children who have swallowed "eye drops"; the main remedial measure is to promptly administer an emetic. Belladonna liniment and ointment are most useful local applications to painful parts. They are also employed to check secretions, for example, in "putting away the milk." The action of atropine in dilating the pupil renders it invaluable in ophthalmic practice. Internally administered the drug is mainly employed to allay muscular spasm and to check night sweats.

Belladonna Lily, *Amaryllis Belladonna,* a native of the Cape of Good Hope, a bulbous plant sending up in September leafless flower-stalks 18 inches high, bearing two or three pink, funnel-shaped blossoms. The strap-shaped leaves are produced later. The plant obtained its name in Italy from the blending of red and white in the flower as in the complexion of a beautiful woman.

Bellaggio, the name of a village on Lake Como. It is much resorted to during the season.

Bellamy, GEORGE ANNE, actress, was the issue of an illicit connection between a school-girl and Lord Tyrawley. Beginning her brilliant career at Covent Garden in 1744, with Quin in *The Orphan,* she led a life of profligacy and extravagance. She was very beautiful, and amongst her intimates were men of the highest mark. It is believed that she was born in 1727 in Lisbon.

Bellamy, JACOBUS, poet, was born in 1757 at Flushing. He was educated at the University of Utrecht. His poems appeared in three volumes in the year 1782–85; they are sentimental and patriotic and of the highest rank in his country. He died in 1786.

Bell-animacule, or VORTICELLA, a bell-shaped INFUSORIAN that grows attached to water plants, fish, floating wood, etc., by a thin contractile stalk; they usually live in colonies. The free end of the bell is closed by a disc surrounded by a circle of cilia and perforated by the mouth. The usual method of reproduction is by fission, but a sexual method sometimes occurs.

Bellarmine, ROBERT, theologian, was born in 1542 at Monte Pulciano, Tuscany. After studying under the Jesuits, he was ordained a priest in 1569 and appointed to the chair of theology at Louvain. In 1599 he was made a cardinal, and in 1602 Archbishop of Capua. He was the main support of the Church of Rome in the sixteenth century. He was learned and in controversy moderate. His chief work, *Disputationes de Controversiis Christianæ Fidei adversus hujus Temporis Hæreticos,* was the main point of the Roman Church's defences that the Reformers attacked for years. He died in 1621, having occupied since 1605 an important position in the Vatican.

Bellary, the name of a town and a district in India in the presidency of Madras. The town is a military station, strongly fortified, and a centre of considerable trade. The district yields cotton, hemp, oil, and sugar cane, besides various minerals. It became British territory in 1800.

Bellay, JOACHIM DU, French poet, was born about 1525. With Ronsard and a group of other writers he formed the "Pleiad," whose object it was to make the French tongue the vehicle of culture as the classical languages of antiquity had been. In the *Défence et Illustration de la Langue Française* he expounds the aims of the Pleiad. His poems comprise a collection of love sonnets, *Les Regrets, Les Jeux Rustiques, Les Antiquités de Rome,* etc. For a time he was secretary to Cardinal du Bellay, a relative. In 1555 he was made canon of Nôtre Dame, and a little before his death, which occurred in 1560, Archbishop of Bordeaux.

Bell Bird, any bird of the South American genus Chasmorhynchus, with four species, ranging from Costa Rica to Guiana and Brazil. The best known species is *C. nivcus,* the "Campanero" of the Spaniards and the "Arapunga" of the native Indians. The male is about the size of a jay, with snow white plumage, and from its forehead there rises a spiral jet-black tube nearly three inches long, and dotted over with small white feathers. The cry is like the deep tolling of a bell, and during its utterance the bird erects this spiral tube, which at other times lies flaccid by the side of the beak. This horn-like tube probably adds to the resonance of the bird's cry, but its exact structure is not determined, owing to the difficulty of procuring specimens for dissection.

Belle-Alliance is the name of a farm on the Charteris road occupied by the centre of the French army during the battle of Waterloo.

Belleisle. (1) A fortified island in the Atlantic, off the coast of the French department of Morbihan, to which it belongs. It was anciently called Vindilis, and Guerveur. Near it, on November 20th, 1759, Admiral Sir Edward Hawke, with twenty-seven line-of-battle ships and six frigates, met M. de Conflans, with twenty line-of-battle ships and five frigates, and totally defeated him, capturing or destroying six sail of the line. The island was

occupied by the British in 1761, but restored to France in 1763. It has an area of about 55 square miles, and a population of about 10,000. The coast scenery is picturesque, though not very lofty. The island is much indented by inlets. It was the birthplace of General Trochu.

Belleisle, CHARLES LOUIS AUGUSTE FOUQUET, COUNT DE, was born in 1684 at Villefranche, Aveyron. After distinguishing himself in the war of the Spanish succession, in Italy, and Poland, he was elevated to the dignity of Marshal of France. In 1757 he was French Minister for War, and as such introduced many reforms into the army service. He died in 1761.

Bellenden, JOHN, poet, appears to have been born about the close of the 15th century at Haddington or Berwick—which is not definitely known. He translated, at King James V.'s request, Boece's history, written in Latin, into Scottish prose, as also the first five books of Livy. For this he was awarded grants from the treasury, and was made Archdeacon of Moray and a canon of Ross. He opposed the Reformation, and in the reign of James V.'s successor he had to take refuge in Rome, where he died in 1550 or 1587 according to Lord Dundrennan.

Bellenden, WILLIAM, was born between 1550 and 1560 at Lasswade, near Edinburgh. He became a professor of belles-lettres in Paris, where he also rendered Queen Mary diplomatic services. He was distinguished for the grace of his Latin style, and, according to Hallam, for his broad and philosophical views of history. His chief work, published 1615, is *De Statu Prisci Orbis in religione, re politica, et litteris;* his other writings have reference mostly to Cicero.

Bellerophon, or HIPPONOÜS, a hero of mythology, had to flee to Prœtus, King of Argos, for refuge. While there the king's wife, Antæa, fell in love with him, an affection that he did not reciprocate. She thereupon got the king to send him to her father, Iobates, King of Syria, with a sealed letter requesting Iobates to put him to death. Not caring to do this with his own hands, Iobates imposed on Bellerophon the task of slaying the Chimæra, which he thought would lead to the hero's death. Mounted on the winged steed Pegasus, given him by Pallas, he succeeded in slaying the monster. Other attempts to kill Bellerophon having failed, Iobates gave him in marriage his daughter Philonoë, by whom he had three children, Isander, Hippolochus, and Laodameia.

Bellerophontidæ, the family of GASTROPODA, of which *Bellerophon* is the type. It is restricted to the Palæozoic except for the cretaceous genus *Bellerophina*. The family has been regarded as referable to the Heteropoda (q.v.).

Belles Lettres, a term adopted from the French to denote the more elegant and lighter departments of literature—including poetry and the drama, fiction, literary and art criticism, and perhaps some forms of history.

Belleville, a Parisian suburb, is situated on the hill-slope to the north-east of the city, and is one of the poor quarters of the city. The lower part was the scene of one of the last and fiercest fights during the Commune, May 27, 1871.

Belleville, in the province of Ontario, Canada, is a flourishing town and the seat of a denominational university.

Bellflower Animal. [LOPHOPUS.]

Bellini, GENTILE, was born in 1428, and was distinguished as a portrait-painter. After a lucrative visit to Constantinople at the invitation of Mohammed II., who employed him on various historical works, he died at Venice in 1507. His chief work is *The Preaching of St. Mark.*

Bellini, GIOVANNI, brother of Gentile, was born about 1424, and like his father and brother became celebrated with the brush. Among his best achievements are the *Circumcision, Feast of the Gods, Blood of the Redeemer,* etc. He did much to make oil-painting popular, and among his pupils were Titian and Giorgione. He died in 1516.

Bellini, JACOPO, a celebrated painter belonging to Venice, was a pupil of Gentile da Fabriano. He excelled in portraits, but most of his works have perished. He died about 1470.

Bellini, VINCENZO, born in 1802, died in 1835. He is best known as the composer of *Norma* (1832), *La Sonnambula* (1831), and *I Puritani* (1834). His works contain much melodious beauty, but little dramatic force.

Bellinzona, a Swiss town, is the capital of the canton of Ticino. Situated on the left bank of the river Ticino, a few miles from the north end of Lago Maggiore, it is a place of some military importance. It was the scene of the Ticino revolution in September, 1890.

Bellite, a powerful explosive, the invention of Mr. C. Lamm, of Stockholm. It consists of a mixture of nitrate of ammonium with a di- or tri-nitrobenzole, and much resembles securite and roburite. It is said to be safe for use in mines in the presence of fire-damp or coal-dust.

Bell Metal, a yellowish grey alloy of copper and tin used in the manufacture of bells. Contains about three parts of copper to one part of tin.

Bellona, the goddess of war among the Romans, is variously described by the poets as the sister, daughter, or wife of Mars. She is represented as armed with a bloody scourge, with dishevelled hair and a torch in her hand. A temple was dedicated to her on the Campus Martius and her priests were named *Bellonarii.*

Bellot, JOSEPH RENÉ, explorer, was born in 1826 in Paris. He was a French naval officer, and in 1851 he joined the polar expedition sent out in search of Sir John Franklin. In one of his explorations in 1852 he discovered Bellot Strait, which was afterwards more fully investigated by McClintock. He was drowned in the following year, and in 1855 his diary was published.

Bellot Strait, on the north coast of North

Franklin Channel. Its length is about 20 miles. It derives its name from Lieutenant Bellot (q.v.).

Bellows Fish, one of the popular names of *Centriscus scolopax*, the only British species of the genus Centriscus. The species occur on the coasts of Australia, China, and the South of Europe, and are small marine fishes, having the body scaly or covered with spines, and are often driven out to sea from their feeble swimming powers. In the Bellows fish the body is compressed and oblong, covered with spiny scales, and with bony plates on the upper and lower surface; the snout is produced so as to resemble a tube which terminates in a long toothless mouth; the two small dorsal fins are placed far back, and the ventral fins are close together, and are received into a groove on the belly; reddish green on the back, silvery below.

Belloy, PIERRE LAURENT BUIRETTE DE, dramatist, was born in 1727 at St. Flour in Auvergne. He played under the name of Dormont, making his first hit in France in 1762, in *Zelmire*, a tragedy of his own. His *Le Siège de Calais* followed in 1765, *Gaston et Bayard* in 1771, admitting him to the French Academy, and *Pierre le Cruel* in 1772. He died in 1775 at Paris.

Bell Rock, or INCH CAPE, a dangerous reef in the German Ocean near the mouth of the Tay. On it is built a lighthouse erected in 1807–10 by Robert Stevenson from plans by Rennie. The height of this lighthouse is 120 feet, its cost was £60,000, and besides a revolving light it has two bells to be rung in foggy weather. The rock has the reputation of having been a source of danger from early times.

Bell's Palsy. [FACIAL PALSY.]

Belluæ, a Linnæan class of Mammals now lapsed. It contained the horses, hippopotamuses, tapirs, and pigs.

Belon, PIERRE, naturalist, was born in 1518 at Soulletière in Maine. After studying medicine he travelled in Germany, Greece, Egypt, Asia Minor, and Arabia, publishing the results in 1553. He wrote treatises also on different departments of animal and vegetable life, the chief being a *Natural History of Birds*, 1555. He was murdered by robbers in 1564 while gathering specimens in the Bois de Boulogne.

Belone. [GARFISH.]

Beloochistan, anciently *Gedrosia*, a country in Asia bounded on the N. by Afghanistan, on the E. by Sind, on the S. by the Arabian Sea, and on the W. by Persia. Its coast-line on the Arabian Sea extends for about 600 miles, yet it has no good harbours, the only places of shelter of any note being Soumiani Bay, Homara, and Gwadar. Its rivers are the Bolan, Rodbat, Lora, Shirinab, Mula, Habb, Sinamani, Marwar, Nari, Urnach, Purali, Shadi, Mokula, Bhasul, Ghish, Gashastan, Dasht, Rakshan, Bhado, Gwargo, Nihing, and Mashkid. It is divided into seven provinces, viz. Kelat, Sarawan, Kohistan, Cutch-Gundava, Jhalawan, Loos, and Mekran. It is in the main an inhospitable country of barren mountain regions, stony deserts, and arid plains. Even its numerous rivers contribute little to its fertility on account of their insignificance. The climate is also very varied, the cold in winter being severe, and the heat in summer intense. It yields different minerals and great variety of fruits, grain, and vegetables. Its manufactures are few and insignificant, being confined to Kelat, the capital. It is peopled by two races—the Baluchis and Brahui (q.v.), speaking distinct languages and subdivided into innumerable tribes. They are described as brave, active, and hospitable. The practice of polygamy is universal.

Belper, a Derbyshire town on the Derwent, famous for its cotton mills, foundries, and, in the neighbourhood, numerous collieries. It gives a title to the Strutt family. Pop. (1901), 22,477.

Belsham, THOMAS, theologian, was born in 1750 at Bedford. In 1778 he became the pastor of a Worcester dissenting body, and in 1781 resident tutor of the Daventry Theological Academy. From being a Calvinist he turned in 1789 to Unitarian, and in 1794 succeeded Priestley in the Gravel-pit Unitarian chapel, Hackney, afterwards removing to the Essex Street chapel, where he remained until his death in 1829. Among his published writings the chief were *Elements of the Philosophy of the Human Mind*, and *Memoirs of Theophilus Lindsey*—his predecessor in the Essex Street chapel pulpit.

Belshazzar, the last Chaldean king of Babylon, was slain B.C. 538 at the capture of Babylon by Cyrus. This is according to the book of Daniel, which, however, is at variance with the cuneiform inscriptions. Apparently he was associated in the kingdom with his father Nabonidus, whom they mention as the last king. The book of Daniel also narrates that Belshazzar had a notice from heaven of his fate in the words written on the wall:—*Mene, Mene, Tekel, Upharsin*, literally rendered, "Numbered, numbered, weighed, and divisions."

Belt, GREAT and LITTLE, two straits connecting the Baltic with the Cattegat. The Great Belt flows between the islands of Zealand and Funen and is about 70 miles long and 15 miles broad; the Little Belt separating Funen from the mainland of Schleswig is of similar length to the Great Belt, but only about half as wide. Both are perilous to navigators, who usually prefer to go by the Sound, which lies to the east.

Beltane, BALTAN, BEALTINE, BELTEIN (from Celtic *Beal*, the name of a deity, and *tin* or *teine*, fire), a Celtic fire festival, formerly celebrated about May 1st and November 1st, and having much in common with the bonfire rites of other branches of the Aryan race. Many writers have attempted to identify the Celtic Beal with the Bel or Baal of the Semites—an attempt which Tylor considers on a level with Sir William Jones's identification of Woden with Buddha.

The Beltane festival is first mentioned in a manuscript of the tenth century by Cormac, Archbishop of Cashel, though it must have originated at a far earlier date. At first it was undoubtedly sacrificial, and it seems to have retained something

of its original character down to the eighteenth and probably to the nineteenth century. Scott, who uses the word in the "Boat Song" in the *Lady of the Lake* as synonymous with Spring, in his *Demonology* attributes the Beltane and similar rites "to a natural tendency to the worship of the evil principle." It is more in accordance with the anthropological teaching of the present day to ascribe them to nature-worship (q.v.).

In Sinclair's *Statistical Account of Scotland* it is said that "on May 1st all the boys (*i.e.* unmarried men) in a township or hamlet meet on the moors, where they dig a trench in which they kindle a fire and bake a cake, which is afterwards divided into portions. One of these pieces is blackened and they are then put in a bonnet, and all draw lots. Whoever draws the black bit is to be sacrificed to Baal, whose favour they mean to implore in rendering the year productive of sustenance to man and beast. . . . They now omit the act of sacrifice, and only compel the devoted person to leap three times through the flames." The same authority says that on All Saints' eve bonfires were set up in every village, and when the fires were extinguished the ashes were raked into a circle. Then a stone was put in the ashes for every person belonging to the families who made the bonfire, and the person whose stone was displaced or injured before the morning was supposed to be destined not to live twelve months from that day. [BONFIRE, HALLOWEEN.]

Belting, an engineering term designating a convenient means for the transmission of power from one rotating piece to another. A *belt* is a flexible band connecting two pulleys. Power given to one of these is transmitted to the other through the belt, which must therefore grip the pulleys sufficiently tight to prevent slipping, and which must also be of suitable dimensions to withstand the stresses given to it. Belts are usually of tanned leather, cut into strips and united by cementing and lacing or riveting. Flat belts of indiarubber, guttapercha, cotton, and even paper are also used. The use of belts of circular section is rapidly extending; these require pulleys with grooved rims, the ropes being of hemp, cotton, or wire. [ROPE GEARING.]

Beltir, a large Tûrki tribe on the Abakân tributary of the Upper Yenesei, South Siberia, in speech and features akin to the Yakuts of the Lena basin. Like the Tunguses and some other Central Asiatic peoples, they expose their dead on the branches of trees in the most secluded parts of the forests. The body is placed in a large coffin with provisions, household utensils and, if a man, his saddle and other valuable effects. This custom dates from remote times, and is analogous to a practice attributed by Herodotus to the ancient Scythians. The Beltirs are polygamists, but seldom have more than two wives.

Beluga (*Delphinapterus leucas*), the White Whale, one of the Dolphin family, closely allied to the Narwhal (q.v.). These animals are from 12 to 18 feet long, creamy white in hue, symmetrical in form, with short stumpy flippers, and a mere ridge in the place of a dorsal fin. They are abundant in the Arctic seas, and extend as far south on the American coast as the St. Lawrence, which they ascend for a considerable distance, and they have occasionally been seen on the coast of Scotland. These animals are gregarious, often appearing in large schools. They are sometimes kept in aquaria, and from their sportive nature afford much amusement to visitors. The Greenlanders capture them in nets, and the North American Indians on the St. Lawrence paint their canoes white and sail in among them, harpooning when opportunity offers, though the soft skin frequently allows the harpoon to drop out. Every part of the animal is valuable, the flesh is eaten, the fat is made into oil, the skin made into leather, and the membranes utilised for various purposes. The female brings forth a single young one in the spring; this is of a bluish-grey, paling with age. The name (which is Russian) is also applied to *Acipenser huso* [STURGEON], and it was in this sense that the word was first used in English.

Belvedere, the name given to a part of the Vatican at Rome, containing the famous statue of Apollo.

Belzoni, GIOVANNI BATTISTA, athlete and explorer, was born in 1778 at Padua. His parents were poor, and he began life with a view to entering the priesthood. Driven from Rome through the occupation of that city by the French in 1798, he ultimately in 1803 came to England, where he maintained himself by exhibiting his feats of strength in the streets. He was of immense size and corresponding strength, and found no difficulty in obtaining better employment. Meanwhile he had paid great attention to the study of mechanics, and in 1815 he submitted to Mehemet Ali, by invitation, a hydraulic machine for the purpose of raising the waters of the Nile. While in Egypt he devoted himself to the investigation of the antiquities of the country. He removed from Thebes and shipped to England the colossal statue of "Young Memnon," now in the British Museum; discovered the temple of Rameses II. at Abusimbel; opened the tomb of Psammetichus, the sarcophagus from which he sent to England; and penetrated for the first time King Chephren's pyramid. After further explorations he returned in 1816 to England and published the narrative of his operations and discoveries. In 1823 he died while on his way to Timbuctoo.

Bem, JOSEPH, Polish general, was born in 1795 at Tarnow, Galicia, and served first in the French army in their expedition against Russia in 1812. After taking part in the Polish insurrection of 1830 he withdrew to Paris, where he gained his livelihood by teaching. In 1848 he joined the Hungarians and won several battles against the Austrians and Russians. After the defeat of Temesvar he escaped to Turkey, where he adopted the Mohammedan faith and became a pasha. He died in 1850 at Aleppo, whither he had been sent to suppress an insurrection of the Arabs.

Bembatoka Bay, on the N.W. coast of

Madagascar. There is a small village, Bembatoka, on the bay, the chief town being Majunga.

Bembo, PIETRO, cardinal, was born in 1470 at Venice. Having laid the foundation of extensive erudition, he entered the Church, ultimately in 1512 becoming secretary to Pope Leo X. In 1529 he accepted the position of historiographer to the Republic of Venice, and shortly afterwards of librarian of St. Mark's. In 1539 Pope Paul III. made him a cardinal, following that up by appointing him to the bishoprics of Gubbio and Bergamo. Among his works are an edition of Petrarch's Italian poems and Dante's *Terzerime*, a *History of Venice* from 1487 to 1513, various dialogues, poems, and essays. He died in 1547.

Bembridge Beds, named from Bembridge, in the Isle of Wight, where they occur, are a fresh-water limestone 15 to 25 feet thick, overlaid by marine marls 62 feet thick, belonging to the Oligocene system.

Ben, OIL OF, a limpid non-drying oil, obtained from the seeds of *Moringa pterygosperma* and *M. aptera*, the horse-radish trees, natives of the East Indies, Western Asia, and North Africa. It is used as a salad oil, for hair oil, and especially as a watchmakers' lubricant.

Benares, the name of a Hindostan town and district in the North-West Provinces of British India. The district is bounded on the N. by Jaunpur, on the E. by Ghâzipur and Shahabad, and on the S. and W. by Mirzapore. It covers an area of 996 square miles. It is in the main fertile, and yields the various grain crops, besides tobacco, opium, sugar-cane, etc. It is watered by the Ganges and other rivers, the former being navigable all the year round. Through it passes the East Indian Railway. The city of Benares is on the left bank of the Ganges, and is one of the most ancient cities in the world, its traditions making it coeval with creation. It is also the chief centre of Hindooism and a place of pilgrimage for the members of that religion. Its trade is considerable, embracing all the produce of the district, and European and American goods. The manufactures are in silks, shawls, gold embroidery, gold filigree work, etc. It is the head-quarters of the commissioners of the district. The chief English institution is Queen's College, which is conducted by a staff from England. There are also Christian missions of various denominations, a hospital and dispensaries for gratuitous relief, and public gardens.

Benavente, a Spanish town in the province of Zamova, near the river Esla. It is now of purely historical interest. Its ancient castle is a ruin. It was once famed for its numerous churches, one of which, San Juan del Mercado, belonged to the Knights Templars. It is associated with various events of the Peninsular War, among them being the commencement of Moore's retreat in 1809.

Benbow, JOHN, son of one of Charles I.'s colonels, was born in 1650, and having served for a time in the merchant service commanded at last a ship of his own. His conduct brought him so much into notice that in 1689 he was offered and accepted a commission in the navy as captain of the *York*. In the following year he was master-of-the-fleet under the Earl of Torrington, and took part in the unsatisfactory action off Beachy Head. He held various other commands, and in 1693 had under his orders a small squadron which bombarded St. Malo. In 1694 he was engaged in the unsuccessful attack on Dunkirk, and was immediately afterwards appointed to the *Northumberland*, a ship in which he much harassed the French Channel ports. In 1696, after he had been wounded during the bombardment of Calais, he was made a rear-admiral, and undertook the blockade of Dunkirk, wherein lay the famous Jean Bart, who, however, adroitly got to sea and escaped. In 1698 he took a squadron to the West Indies. In 1700, as a vice-admiral, he cruised off Dunkirk, and then sailed again for the West Indies, where the French were in superior force. War had for many months been inevitable, and when it broke out Benbow went in search of the enemy. On August 19th, 1702, off Santa Martha Benbow gallantly engaged the French fleet. The disaffection of some of the captains put a stop, however, to the fighting. Benbow ordered four of these officers to be tried by court-martial. One died before trial, one was sentenced to imprisonment, and two were shot for cowardice, disobedience, and neglect of duty. The vice-admiral went to Jamaica, where he had his leg amputated; but he never recovered from his injuries, and died on November 4th. He cannot be ranked as a great commander, but he was an admirable specimen of a rough, brave and honest sailor, and as such he deserves to be cherished for all time in the memory of his countrymen.

Bench, the judge's seat at a court of justice, or the platform on which the seat is placed; hence the judges themselves. To the arrangement of the seats in the House of Lords is due the phrase, "the Bench of Bishops." In the COURT OF KING'S BENCH, originally the king was supposed to sit in person and to dispense justice. BENCHERS are the members of the governing bodies of the INNS OF COURT (q.v.).

Bencher, an important officer of the Inns of Court, which are regulated and controlled by a selected number of the benchers, who possess the power of admitting candidates as members and afterwards of calling such candidates to the bar and of disbarring those who have been called. The benchers exercising these powers are chosen from time to time from those who have attained celebrity at the bar, and it is usual for a King's Counsel to be appointed a bencher on his attaining that rank. In addition to the above, the benchers exercise supervision and control over the professional conduct of all barristers who are members of their inn.

Bench-warrant is a warrant to arrest an accused person issued by the judge before whom an indictment has been found.

Bencoolen, chief town of a Dutch residency on the S.W. of Sumatra. It stands at the mouth of a river of the same name on low and swampy

ground, necessitating the building of the houses on piles. From 1685 to 1825 it belonged to the English, who exchanged it for the Dutch settlement on the Malay peninsula. Its chief products are pepper and camphor.

Bend. This is one of the honourable ordinaries in heraldry, and is formed by two diagonal lines drawn from the dexter chief to the sinister base. If it be charged with any other figure or figures the bend occupies a third part of the field, but if it be plain it is reduced in size to one-fifth. The *bend-sinister* is the same ordinary, but starting in this case from the sinister chief. It is more frequently known as the *bar-sinister* (q.v.). A field equally divided by a diagonal line from the dexter chief to the sinister base is blazoned as "party per bend," and, should it be reversed, it is then known as "party per bend-sinister," but such a coat has none of the opprobrium of illegitimacy attaching to it. A field divided by diagonal lines into four, six, eight, or more pieces, is described as *bendy*.

Benda, GEORG, musician, was born in 1721 at Jungbunzlau, Bohemia. He belonged to a musical family, and, besides being a skilful executant on the piano and violin, composed several operas. He died in 1795 at Köstritz.

Bendemann, EDOUARD, painter, was born in 1811 at Berlin. At the early age of twenty-one he exhibited his celebrated picture *The Captive Jews* in the German capital, and at twenty-six he won the gold medal at Paris. A year afterwards, 1838, he received the post of art professorship in the Dresden Academy, and in 1858 the dictatorship of Düsseldorf Academy.

Bender, a Russian town in the province of Bessarabia, on the Dniester. Besides its manufactures and a considerable trade in such articles as cattle, corn, wine, wood, timber, etc., it has also a citadel which bears the name of the Suwaroff mound. After the defeat of Poltava in 1709, Charles XII. of Sweden lived here till 1712. It was thrice taken by Russia, in 1770, 1789, and 1806, to whom it was permanently ceded by the peace of Bucharest in 1812.

Bendigo, a Victorian county, bounded on the W. by the Loddon and on the E. by the Campaspe. Gold is found in different parts, and it is intersected by the main line of the railway running from Melbourne to Echuca.

Benedek, LUDWIG VON, Austrian soldier, was born in 1804 at Œdenburg, Hungary. After some service during the Galician insurrection of 1846, he assumed the command of a regiment against the Italians in 1848 and against the Hungarian patriots in 1849. In the Italian campaign, 1859, he signalised himself at Solferino. After being governor of Hungary, and commander-in-chief in Venice, he commanded the Austrian army in the war of 1866 with Prussia. The disaster of Sadowa led to his being superseded and court-martialled. Thereafter he retired to Graz, where he died in 1881.

Benedetti, COUNT VINCENT, was born in 1817 at Bastia. After serving as ambassador in Turin and Berlin, he created a sensation by his draft of a secret treaty between France and Prussia, published on the breaking out of the war in 1870. This was followed in 1871 by a pamphlet entitled *Ma Mission en Prusse*, in which he laid the blame for the war on Bismarck's shoulders.

Benedict was the name of fourteen popes. BENEDICT I., 574–8, occupied the papal chair during the Lombard incursions. BENEDICT II. 683–5. BENEDICT III. 855–8, during which the Emperor Lothair appointed Anastasius, an anti-pope, in opposition to the choice of the people and the clergy. BENEDICT IV. 900–3. BENEDICT V., 964–5, was carried off by the Emperor Otho to Hamburg, where he died. BENEDICT VI., 972–4, was strangled at the instigation of Crescentius. BENEDICT VII. 975–84. BENEDICT VIII., 1012–24, was driven from Rome by Gregory, an anti-pope. He was restored by the Emperor Henry II. in 1014. BENEDICT IX., 1033–56, became pope at the age of 18 by means of simony, but was deposed in 1044. BENEDICT X., 1058–9, reigned for only nine months. BENEDICT XI. 1303–4. BENEDICT XII. 1334–42. BENEDICT XIII. the title of two popes: (1) Peter de Luna, 1394–1424, chosen by the French cardinals. He abdicated in 1417, being recognised only by Spain and Scotland up to his death. (2) Vincenzo Marco Orsini, 1724–30, called himself at first BENEDICT XIV. BENEDICT XIV., 1740–58, was distinguished for his learning and the encouragement he gave to literature and science. He promulgated two famous bulls, *Ex quo singulari* and *Omnium solicitudinum*, denouncing a custom that had grown up among the Jesuits in their Indian and Chinese missions, viz. the accommodating of Christian terms and ritual to heathen beliefs and practices.

Benedict, ST., founder of the order of Benedictines, was born in 480 in Nursia, Umbria. While still a mere youth he fled from Rome, where he had been attending school, to escape the wickedness of the capital, and lived in a secluded grotto near Subiaco about 40 miles from the city. When he had spent about three years in this solitude, subjecting himself to the severest discipline, he was invited by the monks of a neighbouring monastery to become their head. His rule, however, proving too strict, he awakened only resentment in the breasts of his inferiors against him and was obliged to leave. Meanwhile his fame only spread the more and crowds flocked to see him, from the wealthy Roman patrician to the wild Goth. After founding twelve monasteries in the valley of the Arno, the vicinity of his retreat, he removed to Monte Cassino near Naples, and there established the monastery that afterwards grew to be the richest and most famous in Italy. Here Totila, the Gothic king, though Rome and Italy were at his feet, sought an interview with this holy man, and here the rules that he afterwards drew up for monks and which became general to Western monasticism, were first introduced. To the merely religious exercises of monasteries he added manual labour, the instruction of the young, and the copying of manuscripts, this last having been the means of

preserving many ancient literary remains. He is said to have died standing in 543.

Benedict, Sir Julius, musician, was born in 1804 at Stuttgart. At the age of twenty he became musical director of the Kärnthnerthor theatre in Vienna, and in 1825 of the San Carlo and Fondo theatres in Naples. Here he produced *Giacinta ed Ernesto* and *I Portoghesi in Goa.* In 1835 he removed to London, where in 1836 at the Lyceum his operetta *Un Anno ed un Giorno* was brought out. In 1838 conductor of the English opera at Drury Lane, he there produced *The Gipsy's Warning, The Bride of Venice* (1843), and *The Crusaders* (1846). In a performance of *Elijah* that he conducted in Exeter Hall Jenny Lind made her first appearance in oratorio, and he in 1850 went as pianist to America with her; his cantata *Undine* appeared in 1860, *The Lily of Killarney* in 1862, *Richard Cœur de Lion* in 1863, *St. Cecilia* in 1866, *The Bride of Song* in 1864, *St. Peter* in 1870, and *Graziella* in 1882. He was knighted in 1871, having been previously naturalised. He died in London in 1885.

Benedict Biscop, an Anglo-Saxon monk, was born in 628 of Northumbrian parentage. He made three pilgrimages to Rome, on his way home from the second entering the Benedictine monastery of Lerins in Provence, where he assumed the tonsure. In 647 receiving a grant of land between the Wear and the Tyne, he founded a monastery which he profusely endowed with books, pictures, and relics collected during his journeys to Rome. In 682 he founded a second monastery at Jarrow, where the Venerable Bede was a monk.

Benedictine. [Liqueur.]

Benedictine Order, the general name of all monks and nuns following the rule of St. Benedict. His first monastery was founded at Subiaco, near Rome, his next at Monte Cassino, near Naples. The order includes an immense number of well-known names—Gregory the Great, the first of a list of fifty Benedictine popes; St. Augustine, his disciple, who preached Christianity in Britain; St. Boniface, the apostle of North Germany; Ausgar, the apostle of Denmark; Adalbert and Casimir, who respectively brought the Gospel to the Bohemians and Poles; Anselm, Bernard of Clugny, and many others. The monasteries of the order are grouped into orders and congregations, named after the abbey in which they have arisen, or from some country or a patron saint. Thus the Cistercians are named from Citeaux; the Camaldolese from Camaldoli, near Arezzo, in Tuscany; the Silvestrians and Celestines from their founder; the Olivetans from the name of their first monastery. At the Reformation the number of Benedictine abbeys was reduced from over 15,000 to about 5,000; at the present day there are about 800. In England there were 113 Benedictine abbeys and seventy-three Benedictine nunneries at the Reformation. The cathedrals of St. Albans, Peterborough, Bath, Gloucester, and Chester; Westminster Abbey, and the churches of Canterbury, Romsey (Hants), Great Malvern, Shrewsbury, and Brecon were all originally Benedictine churches. Iona, too, belonged to the Benedictine order. The modern Benedictine Abbey at Fort Augustus (Inverness-shire), the only one in Scotland, is familiar to travellers by the Caledonian Canal. The great abbey of Monte Cassino, near Naples (founded in 1415, but an abbey had been founded on the site by St. Benedict), was one of the few exempted for the sake of its history when the monasteries were dissolved in 1869. The Armenian Mechitarist monastery of San Lazzaro is a Benedictine house. The rule of St. Benedict was the first to bind a monk to remain in a monastery throughout life. Hospitality and the promotion of learning are also specially inculcated. The Benedictine habit is a tunic, scapular, and cowl with hood; the usual colour is black, though some, as the Cistercians, wear white. The Benedictines were affected by religious legislation in France during 1907, and numbers left that country.

Benediction, an invocation of the Divine blessing (Latin *benedictio*) on persons or things. The term covers, on the one hand, such short invocations as "grace before meat," or the "Pax Vobiscum" usually given at the end of service in the Anglican Church; and on the other, short dedicatory services, more common before the Reformation than now, over new church utensils, new bells, new regimental colours, or foundation-stones. Services of the two latter kinds are still in use. The term is also applied to a short evening service used in the Roman Church.

Benedictus, the thanksgiving of Zacharias on the birth of his son, John the Baptist (Luke i. 68-79), used at Morning Prayer from the ninth century onward, and coming into the Anglican Prayer Book from the Sarum Breviary. It is now the Canticle appointed for use after the Second Lesson. The text in our Prayer Book is nearest to Tyndale's translation of the Bible, but does not precisely coincide with any.

Benefice, a temporary right of property in an ecclesiastical estate, practically limited to reception of the income; almost always certain duties are attached to the benefice, usually the performance of Divine service and the cure of souls. The term is derived from the Latin *beneficium*, used under Charles the Great to denote lands granted to discharged soldiers for their services. (For presentation to benefices, *see* Advowson.) A benefice is a freehold for the holder's life; but he may be deprived or suspended for heresy or immorality, or under the Public Worship Regulation Act; or it may be sequestrated for debt. In this case the Bishop appoints a curate, and assigns him a stipend, till the debts are paid. Benefices are occasionally united, either by the Archbishop of the Province under certain limitations, or by the King in Council, or by special Act of Parliament. To such unions are due the alternate rights of presentation sometimes found. The holder of a benefice must be in priest's orders.

Beneficiary, in English and Scottish law, a person in the enjoyment of the income of property held in trust for others. In English law the technical term is *cestui que trust.* Beneficiaries are entitled to require an account from the trustees,

and to protect the property by legal means against improper acts on their part.

Benefit of Clergy. In the Middle Ages persons who could claim to be clergy (or "clerks") might be tried by a church court, which was considered less severe than a secular court. Laymen, however, could only claim this benefit once. The test was ability to read Latin, and was applied with great laxity. For all great crimes the privilege was abolished at various times soon after the Reformation, and its last remnants were finally got rid of by Act of Parliament in 1727.

Benefit of Inventory. [INVENTORY.]

Benefit Societies are societies for insurance against death, sickness, or inability to work, common among the working classes, and better known as FRIENDLY SOCIETIES (q.v.). The term is sometimes also applied to BUILDING SOCIETIES (q.v.), which enable their members to obtain funds for purchasing land or house property on condition of their making periodical payments to the society.

Beneke, FRIEDRICH EDUARD, was born at Berlin in 1798 and soon distinguished himself as a psychologist, publishing in 1820 his *Theory of Knowledge*, *Empirical Psychology*, and *De Veris Philosophiæ Initiis*. He was opposed to the prevailing systems of Kant and Hegel. Hegel being in high favour with the Prussian government Beneke was banished for ten years, but in 1832 returned to Berlin as "Extraordinary Professor." In 1854 he was found dead in a canal near Charlottenburg and is supposed to have committed suicide. His *Elements of Psychology* has been translated into English.

Benevento, a province and its capital in South Italy. The province, which occupies the central portion of Campania, has an area of 669 square miles. Under the Lombards it was a duchy, and then fell into the hands of the Popes. Napoleon converted it into a principality and bestowed it on Talleyrand. The city was probably founded by the Samnites, and received a Roman colony early in the 3rd century B.C., when its name was changed to Beneventum. Situated on the Appian Way, it was highly prosperous in ancient times, and contains more architectural remains than any town of its size. Trajan's beautiful arch serves as a gateway in the enclosing walls which are of much later date. The amphitheatre has been nearly destroyed, the masonry being used for building. The castle dates from the 12th century, and the cathedral is in the Lombardo-Saracenic style. A large trade is carried on in grain, and the chief manufactures are leather, parchment, and plated goods.

Benevolence, in *English History*, a compulsory loan exacted by the sovereign from the people without legal authority. In 1484 Richard III. passed a law condemning *benevolences*, but nevertheless had recourse to them in the following year. They were finally abolished in 1689.

Benfey, THEODOR, was born in 1809 at Göttingen, where he became professor of Sanskrit and comparative philology. His contributions to the science of language include an edition of the *Hymns of the Sama Veda*, a *Handbook of Sanskrit*, and treatises on the Egyptian and Cuneiform inscriptions, with other works. He died in 1881.

Bengal, called also LOWER BENGAL to distinguish the territory designated from the former presidency of Bengal, which, except as regards the army, is now purely historical, is bounded on the N. by Assam, Bhutan, and Nepaul; E. by Burmah, S. by Burmah, the Bay of Bengal, and Madras, and W. by the North-Western and Central Provinces of India. In 1905, fifteen districts which lie east of the Ganges were detached from Bengal proper, and with the province of Assam they now constitute Eastern Bengal and Assam. The reconstituted area of Bengal is 115,819 square miles. It consists of part of Bengal proper and the three provinces Behar, Orissa (composed of river valleys), and Chutia Nagpur, which is mountainous. In Orissa are the rich deltas of the Mahawuddy river; in Bengal Proper the marvellous deltas of the Ganges and Brahmapootra, higher up whose valleys lies Behar. In these rivers lies the secret of Bengal's wealth and productivity, and what these rivers are to Bengal is thus eloquently described by Mr. W. W. Hunter, director-general of statistics to the Government of India:—"These untaxed highways bring down, almost by the motive power of their own current, the crops of Northern India to the seaboard; an annual harvest of wealth to the trading classes for which the population of the lower provinces neither toil nor spin. Lower Bengal, indeed, exhibits the two typical stages in the life of a great river. In the northern districts the rivers run along the valleys, receive the drainage from the country on each side, absorb broad tributaries, and rush forward in an ever increasing volume. But near the centre of the provinces they enter upon a new stage in their career. Their main channels bifurcate and each new stream so created throws off its own set of distributaries to right and left. The country which they thus enclose and intersect forms the Delta of Bengal. Originally conquered by fluvial deposits from the sea, it now stretches out as a vast dead level, in which the rivers find their velocity checked. The diminished force of their currents ceases to carry along the silt which they have brought down from Northern India. The streams accordingly deposit their alluvial burden in their channels and along their banks, so that by degrees their beds rise above the level of the surrounding country. In this way the rivers in the delta slowly build themselves up into high-level canals, which every autumn break through or overflow their margins, and leave their silt upon the adjacent flats. Thousands of square miles in Lower Bengal thus receive each year a top-dressing of virgin soil brought free of expense from the Himalayas—a system of natural manuring which defies the utmost power of overcropping to exhaust its fertility. As the rivers creep farther down the delta they become more and more sluggish, and their bifurcations and interlacings more complicated. The last scene of all is a vast amphibious wilderness of swamp and forest, amid whose solitudes the network of channels insensibly merges into the sea. Here the perennial struggle between earth and

ocean goes on, and all the ancient secrets of land-making stand disclosed. The rivers, finally checked by the dead weight of the sea, deposit their remaining silt, which emerges as banks or blunted promontories, or, after years of battling with the tide, adds a few feet, or, it may be, a few inches to the foreshore." Excepting its forests, which cover a surface of 12,000 square miles, no other physical feature of Bengal calls for note. The climate is humid and excessively hot, the mean temperature throughout the year being nearly 80° Fah. Bengal has a number of large towns with populations of over 20,000. The principal are Calcutta, 950,000, including the suburbs; Patna, 134,785; Howrah, 158,000. Internal communication is facilitated by railway and canal systems, which are under the control of the Government. Among the mineral products of Bengal are coal, iron, and salt; its great staple crop is rice, while it also grows oil-seeds, jute, indigo, tea, opium, and cinchona. Among its manufactures are silk, sugar from the date, saltpetre, etc. The natives of Bengal, one of the most densely peopled regions on the globe, present a considerable diversity of type according to their origin and environment. But the great bulk of the lowland peasantry are a somewhat feeble race, of dark olive complexion, short stature, and slender extremities, lacking both the physical energy and moral tone of the populations of the more elevated districts such as Berar, Audh, and the Doab. The substratum is certainly non-Aryan, partly Kolarian, partly Dravidian, and even Indo-Chinese and Tibetan, but for many ages subject to Aryan influences, and now mainly Aryan in religion (Hindus) and in speech, the current languages (Bengali, Berari, Hindi, Urdu, etc.) being all essentially neo-Sanskritic, that is, modernised forms of the old Prakrits or vulgar Sanskrit dialects. Many of the upper classes, especially the high-caste Brahmans and Kshatrias, have even largely preserved the regular features, but not the fair complexion, of the primitive Aryan intruders from the north-west. The Bengali is endowed with a considerable degree of intelligence or shrewdness, but is indolent and unscrupulous, and excessively fond of litigation. Many of the upper classes have received a varnish of European culture, and have acquired a certain fluency in the English language. [Babdo.] The serious side to the Bengali character is manifested in the rise of the *Brahmo-Somâj*, a religious movement which aims at the reform of the Hindu system on a monotheistic basis.

Bengalese, a dealers' name for a white variety of *Spermestes acuticaudata*, with pale pink feet and bill. By continuous cross-breeding the Japanese have produced white and pied strains from a naturally brown-black bird.

Bengal Lights, mixtures burning with fine coloured flames. They may be formed by mixing potassium chlorate, or nitre, together with carbon or sulphur, and the chemical employed to give the desired colour to the flame. For green lights, barium salts may be used, for crimson, strontium salts, for blue, antimony or copper salts, and for yellow, sodium salts. It should be noted that there is danger in mixing together potassium chlorate and sulphur, as the mixture explodes if struck by the pestle, and may explode spontaneously owing to the presence of sulphuric acid in the sulphur.

Bengazi (classic *Berenice*), the capital of Barca, N. Africa, is situated on the Gulf of Sidra, with a salt lagoon to the landward. The port is silted up, but a fair number of trading vessels embark and discharge goods by means of lighters. Though ruinous and neglected the town retains traces of ancient wealth in its buildings, among which are a castle and a Franciscan monastery. Until quite recently a brisk trade in slaves was carried on with Egypt, but at present the exports are sheep, wool, grain, butter, and salt.

Bengel, Johann Albrecht, born in Würtemburg in 1687, was educated at Tübingen and entered the Protestant ministry. His life was spent in directing with great ability the Seminary at Deukendorf, and in discharging the duties of consistorial counsellor at Stuttgart. His fame, however, rests on the laborious and intelligent zeal which he devoted to the textual criticism of the Greek Testament. His edition is still held in esteem, and even more valuable is the *Gnomon*, or expository index that followed it, a work that won the praise of John Wesley, and has given much help to commentators. He died in 1752.

Benguela, a district on the W. coast of Africa, in the Portuguese Protectorate of Angola. It extends from the Coanza to the Cunene river, between 10° and 17° S. lat. with vague limits inland. It is a well-watered and fertile district sloping up to mountains of considerable height, and at various levels producing a great variety of crops. There is also much undeveloped mineral wealth. The Portuguese in 1617 founded the town of S. Felipe de Benguela about the middle of the coast. Since the suppression of slavery it has dwindled into insignificance. Other towns are Catumbela, Bihé, and Quicombo. The southern part of Benguela is known as Mossamedes, and forms a separate government, the capital, which bears the same name, being in Little Fish Bay.

Beni, a river in S. America which rises in Bolivia, not far from Mount Illimani, and flows to the N.E. with a navigable stream till it joins at Biera the Rio Mamore, and thus passes into the Madeira, the chief tributary of the Amazons. It gives its name to a large province.

Benicia, the former capital of California, United States, is situated on the north side of the Strait of Karguenas, in the Bay of San Francisco, and is connected by railway with Sacramento. The harbour is excellent, and the works of the Pacific Steamship Company are near it. The *Benicia Boy* was the name given to the pugilist Heenan, who fought Tom Sayers (q.v.).

Beni-Hassan, a village in the province of Vostani or Middle Egypt, on the right bank of the Nile, 15 miles above Minieh. The name is tribal,

and signifies *sons of Hassan*. The tombs of the twelfth dynasty that are to be seen here exhibit some remarkable architectural features.

Beni Israel (*Sons of Israel*), a people of Jewish origin and type, settled for at least a thousand years past in Bombay and other towns, on the W. coast of India. Some of them know Hebrew, but their language is Maráthi, and they possess some literature. They observe the Levitical distinctions of clean and unclean food, and keep Jewish feasts including the Sabbath, but seldom intermarry with ordinary Jews or with an inferior class among them, the Kala Israel or black Israel, consisting of half-breeds and the descendants of proselytes.

Benin, a country, city, and river on the W. coast of Africa. The Portuguese first visited this region towards the end of the 15th century, and for some years carried on a trade in slaves. In 1906 Benin came under the united Colony and Protectorate of Southern Nigeria, forming part of the Central Provinces. Cannibalism and human sacrifices still exist, but are being rapidly stamped out. The country is fertile, being watered by the Lower Niger. Products: palm oil, cereals, cotton, sugar, and tobacco. The population is rather dense, and their manners and customs are similar to those of Ashanti. Benin, the capital, is on the river of the same name, about 73 miles from its mouth. It covers a large space, but has a decayed and deserted aspect. The river, called by the natives Uwoko Jakri, and by the Portuguese Rio Formoso, is the western branch of the Niger. It was the scene of a massacre of some British subjects in 1897, which was followed by a punitive expedition and the submission of the king.

Benin, The Bight of, the bay that forms the northern part of the Gulf of Guinea. It extends from the Gold Coast to the mouth of the Niger; it has no harbour accommodation.

Beni-Souef, a town of Middle Egypt, 72 miles above Cairo, on the right bank of the Nile. It serves as a mart for the produce of the fertile valley of Fayûm, and has cotton-mills and quarries of alabaster.

Benitier, a vessel or font for holy water placed near the entrance of Roman Catholic churches, being generally attached to one of the pillars.

Benjamin (Heb. *son of the right hand*) was the youngest son of Jacob by his wife Rachel, who on her death-bed called the child Benoni (*son of my pain*), a name changed subsequently. He was the favourite of his father and apparently of his brother Joseph, but little is known of his life except his journey into Egypt at the urgent request of the latter, and his detention there (Gen. xlii. xliii.). The tribe that descended from him was numerically the smallest, but displayed fighting qualities (Num. xxvi. 41), and was almost exterminated by the rest of the nation (Judges xix. xx.). It appears to have speedily recovered, and in Asa's time boasted 280,000 warriors. Saul, the first King of Israel, was a member of the tribe, and Jerusalem came within its territory. Always closely connected with Judah, Benjamin remained with that tribe in the schism that followed Solomon's death.

Ben Lawers, a mountain in the centre of Perthshire, Scotland, 32 miles W.N.W. of Perth, and on the W. side of Loch Tay. Its height is 3,984 feet.

Ben Lomond, a mountain in Stirlingshire, Scotland, on the E. side of Loch Lomond, having an altitude of 3,192 feet. It is the highest point of the most southerly extension of the Grampians. The N. side has a precipitous face 2,000 feet high.

Ben Macdhui, a mountain in Aberdeenshire, forming part of the Cairngorm group at the head of Glen Dee. It has an elevation of 4,390 feet.

Bennett, or Benett, Henry, Earl of Arlington, was born of a good Middlesex family in 1618, and educated at Oxford. He fought as a royalist, and acted also as secretary to Lord Digby. He served the Duke of York in the same capacity, and was for several years employed by Charles II. in France, Italy, and Spain, where he acquired a diplomatic training. At the restoration he was promoted from knighthood to a barony, and later to an earldom. As chief Secretary of State he was largely responsible for the Dutch war and the Triple Alliance, and in 1670 he played a leading part in the Cabal (q.v.). He received the Garter in 1672. Under James II. his influence waned, and he died in 1685. Macaulay belittles him, but Clarendon, to whose policy he was hostile, speaks of him in respectful terms, and he compares favourably with statesmen of the period.

Bennett, James Gordon, born near Dumfries in 1795 and educated for the Roman priesthood, abandoned that career and emigrated (1819) to America. After hard struggles as a teacher, printer, and journalist, he found himself in New York in 1835 no better off than at starting. He contrived to start in a cellar a little one-cent sheet, which he edited and sold himself. Thus was the *New York Herald* founded, and Bennett by his industry, shrewdness, enterprise, and knowledge of the American public, soon developed it into a magnificent property. He continued to edit and manage the paper till his death in 1872, and one of his last strokes of business was to send Stanley to Africa in search of Livingstone.

Bennett, William (1804–1886), a celebrated High Churchman, incumbent of St. Paul's, Knightsbridge. He was the defendant in the celebrated trial of Sheppard *v.* Bennett (1872). He was, however, judged to be not antagonistic to the Church of England in his teaching.

Bennett, Sir William Sterndale, was born at Sheffield in 1816, his father being an organist. From 1826 to 1836 he was a pupil at the Royal Academy of Music, and began early to compose. He attracted the attention of Mendelssohn and Schumann, spending some time in Germany. How far he sank his individual talents in slavish

subservience to the great master is a matter of dispute with critics. He certainly made a name abroad long before he won any popularity at home, where he was thought more of as a teacher than a composer. In 1856 he was appointed professor of music at Cambridge, and conductor of the Philharmonic Concerts. *The May Queen*, his most successful cantata, was produced at Leeds in 1858. The overture of *Paradise and the Peri* followed in 1862, and *The Woman of Samaria* came out at Birmingham in 1867. Among his other works the best known are *The Lake, the Millstream, and the Fountain*, his pianoforte pieces the *Overture* to *The Naiads*, and his *Symphony in G minor*. In 1868 he was made principal of the Royal Academy of Music. He died in 1875.

Ben Nevis, the highest mountain in the United Kingdom, is in the S.W. corner of Inverness-shire, between Loch Eil and Loch Leven, and 7 miles distant from Fort William. It has an elevation of 4,406 feet, and the circumference of the base measures 24 miles. To the N. and N.E. its flanks are very precipitous with a sheer height of 1,500 feet. Geologically the structure may be described as granite and gneiss capped with porphyry. In 1883 the Scottish Meteorological Society opened an observatory on the summit, but it was closed in 1905.

Benningsen, or BENINGSEN, LEVIN AUGUSTUS THEOPHILIES, COUNT, was born at Brunswick in 1745, and in 1773 left the Hanoverian army to take service under Catherine of Russia. In 1791 he was sent by Catherine into Poland, where he was successful, and in 1801 he supported the conspiracy against Paul. In 1805 he commanded the army of the north, but became commander-in-chief in 1807, and fought the battle of Eylau. In 1812 he held the Russian centre at the battle of Moskowa, and he contributed indirectly to the victory at Leipzig. He died in Germany in 1826.

Benningsen, RUDOLPH VON, was born at Luneberg in 1824, and after a successful start as an advocate became judge at Göttingen, but in 1856 abandoned that position for a political career, leading the Opposition in the Hanoverian Parliament. When Hanover was annexed he became a member of the Prussian Chamber and of the Reichstag, and in 1870–71 he conducted important negotiations in S. Germany and at Versailles for the establishment of the empire. In 1873 he was chosen president of the Prussian House of Deputies. He has long been one of the leaders of the National Liberal party.

Ben Rhydding, a village prettily situated in the Wharfedale district of Yorkshire, 12 miles from Leeds by the Midland Railway. The handsome hydropathic establishment is a great resort of invalids and tourists. Denton Park in the parish was the home of the Fairfaxes.

Benson, EDWARD WHITE, D.D., was born in 1829 near Birmingham, and was educated at the King's School there and at Trinity College, Cambridge, of which he became scholar and fellow. After holding a mastership at Rugby he was in 1858 appointed first head-master of Wellington College. Leaving this post after fourteen years he became chancellor of Lincoln cathedral, but in 1876 was chosen by Lord Beaconsfield as bishop of the new see of Truro. On the death of Dr. Tait in 1882 Mr. Gladstone procured his translation to Canterbury. He was a moderate High Churchman, but avoided controversial entanglements with much tact, and adopted a conciliatory tone towards all parties. He died in 1896.

Bent Grass, a name commonly applied to various species of the genus *Agrostis* and other grasses, occurring in damp pastures and on dry waste ground, the dried stalks of which remain standing at the close of the grazing season.

Bentham, GEORGE, was born at Stoke, near Plymouth, in 1800, being the nephew of Jeremy Bentham, the jurist (q.v.). In his youth he resided a good deal in France, managing his father's vineyards. He then acted as his uncle's editor, and in 1827 published *Outlines of a new System of Logic*, setting forth the doctrine of the quantification of the predicate. His attention was early directed to botany, and from 1829 to 1840 he acted as secretary to the Royal Horticultural Society, and from 1861 to 1874 as president of the Linnean Society. Among his chief botanical works were the *Flora of Hong-Kong*, 1861, the *Flora Australiensis*, 1863—1878, and the *Genera Plantarum*, written in conjunction with Sir Joseph Hooker, 1862—1883. He became F.R.S. in 1862, and C.M.G. in 1878, and was also an LL.D. of Cambridge. His extensive herbarium was presented to the nation, and is preserved at Kew. Bentham died in 1884. The genus *Benthamia*, belonging to the *Cornaceæ*, was dedicated to him by Lindley.

Bentham, JEREMY, the son of a prosperous attorney, was born in Red Lion Street, Houndsditch, in 1748. He was educated at Westminster and Queen's College, Oxford, being called to the bar in 1772. He heard Blackstone lecture at the university, and listened with delight to Mansfield's judgments in the Court of Queen's Bench, but so far from being stirred to seek forensic distinction, he felt a burning zeal to rebuild on a rational basis the whole edifice of jurisprudence. From Beccaria he adopted as the keystone of his philosophy the doctrine that human society has for its aim "the greatest happiness of the greatest number." Applied to ethics this formula became the principle of the school of moralists, afterwards called Utilitarian. His first essay, entitled *A Fragment on Government*, appeared anonymously in 1776, and at once met with attention. In 1780 he published his *Introduction to the Principles of Morals and Legislation*, a more elaborate exposition of his theories and aims. He then spent some time with his brother in Russia or travelling on the Continent, where he wrote *A Defence of Usury*. In 1792 he was made a French citizen, a proof that his ideas were exercising widespread influence. Settling down in Queen Square he devoted the rest of his long and

laborious life, amid the congenial society of such men as the Mills, the Austins, Samuel Romilly, Brougham, and Bowring, to elaborate criticisms of laws and institutions, and to the still more arduous task of reconstruction. Every principle and every application of it was subjected to rigorous logical tests, and Bentham's mind, unwarped by professional training and pecuniary need, was especially suited to the work. The dream of his life is still far from being realised, and there is a tendency of late to treat him as a dry *doctrinaire*, but it is hardly too much to say that all the reforms that the 18th century has witnessed in our judicial system and most of our advances in social legislation were indicated with precision by Bentham many years before their adoption, whilst his exertions have borne fruit all over the world. No doubt the style and phraseology of his later writings marred his fame. He lived until 1832, and before his death gave instructions that his body should be dissected, embalmed, dressed in his usual clothes, and preserved in the museum at University College, London, where it still remains.

Bentinck, LORD GEORGE, the third son of the fourth Duke of Portland, was born in 1802. Canning, his uncle by marriage, took him as private secretary, and in 1826 he was elected member for King's Lynn. At that time he was nominally a Whig, but like many of the aristocratic members of the party held loosely to old ties. In 1835 he followed Lord Stanley in seceding to the Tories, and like most converts became more thoroughgoing than those of the old faith. He left Sir Robert Peel in 1846 on the repeal of the corn laws, and stood forth as leader of the Protectionists until his sudden death in 1848. He was not a brilliant man, but he possessed some sterling qualities of head and heart. He was, perhaps, a greater loss to the turf than to Parliament, and owes his fame chiefly to Lord Beaconsfield's memoir.

Bentinck, LORD WILLIAM HENRY CAVENDISH, the second son of the third Duke of Portland, was born in 1774. At the age of 17 he entered the army, and in 1796 was returned as member for Camelford. He took little part in politics, being attached to Suwaroff's staff from 1799 to 1801. In 1803 he went out to India as Governor of Madras, but the mutiny at Vellore, brought about by his injudicious treatment of the native troops, led to his recall in 1808. He then went out to the Peninsula, and was present at the battle of Corunna. In 1827 he accepted the post of Governor-General of India. His rule was marked by striking reforms. He put the finances of the country in a healthier condition by cutting down expenses, imposing licence duties, abolishing the system of "double batta," and bringing under taxation large areas that had hitherto enjoyed immunity. He also encouraged the employment of natives by Government, and inaugurated great educational schemes. In 1833 the charter of the Company was renewed on condition that complete freedom of trade should be established with England, and a legal member added to the Governor's Council. Macaulay was sent out as the first occupant of that post. Few wars disturbed Bentinck's governorship, and except in the cases of Coorg and Mysore there was little interference with the native states. He returned to England in 1835, and became member for Glasgow in 1837, but he died in 1839 before he had taken any important part in home politics.

Bentley, RICHARD, was born in 1662 at Oulton in Yorkshire, where his family had been reduced to poverty by adherence to the Royalist party. His mother looked after his education, and from the Grammar School at Wakefield he passed as a sizar to St. John's, Cambridge. The college sent him as head-master to Spalding School, and Stillingfleet, Dean of St. Paul's, soon after employed him for six years as tutor to his son, whom he accompanied to Oxford. All this time he was accumulating vast stores of classical learning, and at Oxford he became acquainted with the leading scholars of the day. His *Epistola ad Millium* (1691), appended to Mill's edition of *Malalas*, proclaimed him the ablest critical emendator of the day. He had now taken orders, and in 1692 was appointed Boyle Lecturer, receiving next year a prebendal stall at Worcester, the posts of royal librarian and chaplain with the living of Hartlebury. For some years, though busy in small undertakings, he attempted nothing on a large scale, and it was almost by accident that in 1697 he inserted in a work of Wootton's some remarks exposing the spurious character of the *Epistles of Phalaris*, which Boyle (afterwards Earl of Orrery) had edited at Oxford. Atterbury and Smalridge helped Boyle to write a foolish reply, whilst Swift, Pope, and Garth abused the dull Cambridge pedant. In 1699 Bentley published his famous *Dissertation*, crushing down his opponents by the weight of his erudition and making reply impossible. He was forthwith selected by the Crown for the mastership of Trinity College, Cambridge. Here the rest of his life was utterly wasted. He determined to sweep away the disgraceful corruptions that had grown up both in the college and the university, but he set about the task with a heavy hand, often resorting to means as little creditable as those by which his reforms were met. Twice he was nominally deposed by the fellows, the vice-chancellor, and the Bishop of Ely, but the courts of law protected him in some measure, and amidst endless wrangling he succeeded in holding his ground till death removed him in 1742. During the intervals of the fray he brought out his editions of Horace, Terence. Phædrus, Publius Syrus, and Manilius; his reply to Collins, in which he defended the text of the Greek Testament against the freethinkers; his criticism of Menander and Philemon; and his absurd reprint of the *Paradise Lost*. He was engaged on the text of Homer when he died, and left some valuable material to future scholars. His ingenuity led him to make wild emendations in Milton no less than in the Greek poets, and his lack of taste prevented his seeing how such verbal changes spoiled the beauty of the original; but in mere knowledge he had and has no rival.

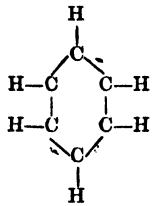
Benton, THOMAS HART, was born in North

Carolina, U.S.A., in 1782, and settled as a lawyer in Tennessee, where he became a member of the legislature. In 1812 he served on General Jackson's staff, and afterwards started a paper at St. Louis. In 1820 he was elected senator for the new state of Missouri, and for thirty years played an active part in politics, opposing Calhoun, and supporting Jackson in his attacks on the United States Bank. He wrote a *History of American Affairs from* 1820 *to* 1850, and an *Abridgment of the Debates in Congress from* 1789 *to* 1856. He died in 1858.

Benüe, BINUE, BENUWÉ, or CHADDA, a river in Upper Guinea (Niger Protectorate), West Africa. It joins the Quorra, or Niger, on the left at some 230 miles above its mouth, having flowed down from the mountains in the Adamawa country, a distance of about 300 miles. The Royal Niger Company since 1886 has navigated most of its course.

Benyowsky, COUNT MAURICE AUGUSTUS DE, born in Hungary in 1741, joined the Poles in their revolt against Russia (1768), and being captured was sent to Kamchatka. There he married the governor's daughter and escaped to Macao. He got back to Europe, and was employed by the French (1774) to establish a colony in Madagascar. He was chosen as king by the natives, and then sought the support of England. On his return to the country in 1785 the French took up arms against him, and he was killed. He left some interesting memoirs.

Benzene, also called BENZOL, a hydro-carbon of the composition represented by C_6H_6. The name is derived from the gum benzoin (q.v.). It is contained in coal-tar, which forms the chief source of all the benzene compounds. When coal is distilled for the production of illuminating gas, tar and ammoniacal liquors are also obtained. The coal-tar contains a large number of solid and liquid substances, amongst which are benzene and certain of its derivatives This tar is then distilled. The portion of the distillate which comes over below 160° is known as *Light Oil*, the part distilling over between 160° and 250° is known as *Intermediate Oil*, and the distillate above 250° is called *Heavy Oil*. The light oil consists chiefly of benzene and some derived products. It is washed first with caustic soda, and then with sulphuric acid in order to remove certain acid and basic substances, viz. phenol and pyridine. It is then distilled in a suitable form of apparatus, and the part distilling over first consists of *benzene*. Benzene thus obtained is a colourless liquid which boils at 80·5°, and has a sp. gr. of ·899. It has a peculiar odour, and the vapour when inhaled produces giddiness. It burns with a bright flame. It is very extensively used for the manufacture of the aniline colours, and as a solvent for many organic compounds. It is also of very great theoretical importance, as it is the starting-point of an exceedingly large number of compounds known as the *benzene derivatives* or the *aromatic compounds*. On this account its constitution has been, at different times, the source of much speculation, and it is now generally accepted that the carbon atoms are all arranged in the form of a *closed* chain, each being united with one hydrogen atom and two other carbon atoms, as represented by



By replacement of one or more hydrogen atoms by other elements or radicals a large number of derivatives can be obtained. By replacement of hydrogen by hydroxyl (OH) or carbolic acid (q.v.) *phenol* results. By substitution of the acid group CO.OH for a hydrogen atom, *Benzoic* acid C_6H_5-CO OH is obtained, which can be obtained as needle-like crystals, melting at 121° by sublimation of *Benzoin*. If only one hydrogen atom is replaced, the group C_6H_5 persists; this group is called *phenyl*. The compound *Aniline* (q.v.) is an example of this class. Many of its derivatives contain the group C_6H_5CO. These are called *Benzoyl* compounds. Thus benzoyl chloride has composition C_6H_5COCl. Other compounds contain the group C_6H_5CH, and are called *Benzal* compounds, benzal chloride would thus be $C_6H_5CHCl_2$. Those containing $C_6H_5CH_2$ are known as *Benzyl* compounds. [For other derivatives of Benzene *see* BITTER ALMOND OIL, CARBOLIC ACID, SALICYLIC ACID, PYROGALLIC ACID, HYDROQUINONE.]

Benzoic Acid is an antiseptic, an expectorant, and a diuretic. It had at one time a considerable reputation in the treatment of pulmonary affections. Its main use at the present day is in diseases of the bladder. It appears in the urine as hippuric acid, and so serves to restore the normal acid reaction to that excretion, when it is rendered alkaline in certain forms of disease. Ammonium Benzoate has the same therapeutic action as Benzoic acid. [BENZENE.]

Benzoin, a fragrant gum-resin obtained from *Styrax Benzoin*, the Benjamin tree, a native of Siam, Sumatra, Borneo, etc. It is obtained by incisions, each tree yielding about three pounds weight annually. It is used in bronchitis, etc., forming a principal ingredient in "Friar's Balsam;" but it is chiefly employed as incense in the Greek Church. The name is also applied to a genus of *Lauraceæ*.

Benzoin Resin. Its main medicinal use is as an external application to wounds, in the form of Friar's Balsam, the compound tincture of Benzoin. Internally it is occasionally employed as an expectorant in chest affections.

Benzoline, a mixture of paraffins (q.v.), boiling between 70° and 100°, and obtained by

distilling paraffin oil or petroleum. Is used for illuminating purposes.

Benzoyl. [BENZENE.]

Benzyl. [BENZENE.]

Beowulf, the mythical hero of an Anglo-Saxon romance or epic, which is written in probably the earliest form of that language as imported into England. The only manuscript of this remarkable poem is preserved in the Cotton Library in the British Museum, and dates from the tenth century, but the original composition may very likely be referred to the fifth century, though after the spread of Christianity some later touches were most likely given in the eighth or ninth century. Nothing is known of the author, but the work is full of vigour and rugged beauty. Beowulf is represented as being a Western Dane, and the scene of his exploits was the north.

Béranger, PIERRE JEAN DE, was born at Paris of mediocre parentage in 1780. He was in early life apprenticed to a printer at Péronne, from whom he seems to have picked up a taste for versifying. Coming to Paris, he was struggling against poverty when Lucien Bonaparte generously took him up, and he also got a humble clerkship in the office of the university. Some of his most sparkling songs and fugitive pieces were composed at this time, and began to get in vogue. He was in 1813 admitted to the *Caveau Moderne*, and became the rival of Désangiers. A democrat in principle, but not insensible to the glamour of Napoleon's career, he dealt playfully with politics until the restoration, but he then assailed the government with bitterness, and was imprisoned. The revolution of 1830 found him at the height of his popularity, and he was sent to the Constituent Assembly in 1848 as deputy for the department of the Seine. He soon retired from public life, and spent his remaining years in literary work and in the society of his devoted friends. He died in 1857. Politically Béranger's poems did much to keep alive the Napoleonic tradition and prepare for the Second Empire. They stand almost alone in their particular department of the lyric art. They are almost as carefully polished as the odes of Horace, and yet they are always addressed to a popular audience. Now and then his wit is inclined to indecency and profanity, but he is generally stirred by pure and kindly emotions, while he occasionally displays tragic pathos.

Berar, also known as the Haiderabad Assigned Districts, is a province of Central India, lying between Central Provinces N. and E., Bombay W., and Nizam's Dominions S., and having an area of 17,711 square miles. It comprises the provinces of Amraoti, Ellichpur, Wun, Akola, Buldana, and Basim, and forms a commissionership under the British resident at Haiderabad. Occupying mainly a broad valley, the basin of the Parna river, between the Ajanta and Satpura hills, it is divided into the Pahyanghat or lowlands and the Balaghat or uplands; the former being very fertile and yielding large crops of millet, seed, wheat, pulse, tobacco, and especially cotton. There is a salt lake at Louar, and coal and iron exist in the province.

Berat, a town of Albania, Turkey, in the province of Janina, 30 miles from the port of Avlona. It is the seat of a Greek archbishopric.

Berber, a town on the right bank of the Nile, near the confluence of the Atbara. It is important as the point at which the caravans from Cairo and from Suakin meet on the way to Khartoum, and in 1885 the British commenced a railway from Suakin to this place, but the works were soon abandoned. Later in connection with Kitchener's campaign, the line was completed beyond Berber.

Berber, the collective name of the western branch of the Hamitic race, extending along the Mediterranean seaboard from the Siwah oasis, west frontier Lower Egypt, to the Atlantic, and occupying the whole of the Sahara as far east as about 13° or 14° E. long. Here they are conterminous with the Tibbus of the East Sahara, and since the spread of Islâm their own domain has been largely encroached upon by the Arabs. The Berbers, who give their name to the "Barbary" states, and who are undoubtedly the true aborigines of North Africa, are grouped in three great divisions: The *Tuaregs* of the Sahara; the *Shilluhs* (*Shluhs*) of Morocco; and the *Kabyles* of Algeria and Tunis, The name Berber itself, though of doubtful origin, is of vast antiquity, and already occurs under the form *Beraberata* in an inscription in the Temple of Karnak dating from the time of Rameses II., about 1400 B.C. The Berber type, wherever it has not been modified by the negro of Sudan, is essentially Caucasian, that is, regular in the European sense; even the complexion is fair, often not more swarthy than that of Spaniards or Sicilians. Many of the Kabyles have even light hair and blue eyes, though this has been attributed to contact with the Romans, and later with the Vandals who invaded North Africa under Genseric, and became absorbed in the surrounding populations. But on the Egyptian monuments of the fourteenth and fifteenth centuries B.C. the Libyans and other peoples west of Egypt (all Berbers) are already depicted with a pink complexion, blue eyes, and fair or red hair. The Berber language, current throughout the whole of the Berber domain in forms not differing from one another more than Italian from French, constitutes a distinct branch of the Hamitic linguistic family, and is consequently allied to the Old Egyptian and to the Ethiopian (Beja, Somal, Galla, etc.) of the north-east African seaboard. The Shluhs and Tuaregs apply to the national speech the term *Tamashek* (properly *Tamazigt*) in the sense of "noble" or "free," this word stripped of its feminine prefix and postfix *t* being identical with the *Maxyes* of Herodotus, that is, the Amzigh (Imazighen) or "Freemen" of Mauritania. Berber possesses an alphabet which dates from remote prehistoric times, but the existence of which was first discovered by Dr. Oudney in 1822. Specimens of this *tafinagh* writing, as it is called, occur in numerous rock inscriptions scattered over the Sahara and

Mauritania. The letters, 35 in number, closely resemble old Semitic forms, and their Carthaginian (Punic or Phœnician) origin is now demonstrated, and is even indicated by their very name ta-finagh, where *finagh* = Phœnician. *See* Shaler, "Communications on the African Berbers," in the *Memoirs of the American Philosophical Society*, Philadelphia, 1824; Graberg de Hemsæ, "Remarks on the Language of the Amazirghs, commonly called Berebbers," *Journal of the Royal Asiatic Society*, 1836; General Hanoteau, *La Kabylie*, etc., Paris, 1872-73.

Berberah, a good harbour in the Somali country, East Africa, situated on the Gulf of Aden, and occupied since 1884 by a small detachment from the garrison of that station. A large fair is held here annually.

Berberideæ, the natural order of dicotyledonous plants to which the barberry belongs. There are 12 genera and over 100 species in the order, which is absent from Africa, and Australasia. They are shrubs or herbaceous perennials with scattered leaves, generally compound and spinous; sepals, petals, and stamens generally equal in number; stamens opposite the petals and dehiscing by valves, and fruit of one carpel, either dry or succulent. Bitter astringent properties prevail throughout the group.

Berbice, once a separate colony, has since 1831 been united with Essequibo and Demerara to form British Guiana. It produces sugar, cocoa, and magnificent timber. The capital is New Amsterdam, on the right bank of the Berbice river, which is navigable for 170 miles.

Berchta, or BERTHA (O.H.G. *Perahta*, bright), corresponded in the ancient superstitions of South Germany to the goddess Hulda in the North. She was, however, of a more stern and forbidding character than her northern sister, and her festival was a fast prescribed under severe penalties. Her personality has been a little mixed up with that of historical Berthas, and enters into many local legends. Perhaps through the attribute "brightness" she was especially associated with the feast of the Epiphany.

Berchtesgaden, a mountain village in Bavaria, 15 miles S. of Salzburg. It has large salt-mines, worked by the Government, and a royal hunting lodge which occupies the site of an ancient abbey.

Berdiansk, a port in the government of Taurida, South Russia, on the N.W. shore of the Sea of Azov. The harbour is the best in the district, and a large trade is carried on.

Berditchef, a town in South Russia, 108 miles by railway S.W. of Kiev. It has, until recently, been largely populated by Jews, and at the five annual fairs a great deal of business has been done in corn, cattle, wine, and local products.

Bereans, a religious sect, founded in 1773 by the Rev. John Barclay, whence they are also known as *Barclayites*. They called themselves *Bereans*, from the allusion in Acts xvii. 2 to the people of Berea, who "received the word with all readiness of mind."

Berengar I., son of Eberhardt, Duke of Friuli, caused himself to be proclaimed king of Italy in 888, and, getting rid of his many rivals, was elected emperor in 915. In 923 his nobles, fearing his encroachments, supported Rudolph II. of Burgundy in usurping the throne, and Berengar was thrown into prison at Verona and was killed in 924.

Berengar II., grandson of the foregoing, was by the help of the Emperor Otho (950) restored to a part of the dominions of his ancestor, but as he refused to acknowledge himself Otho's vassal, he was after a struggle deposed and imprisoned at Bamberg, where he died in 966.

Berengarius was born at Tours in 998 and was educated by Fulbert of Chartres. In 1031, as master of the cathedral school in his native city he acquired great fame, but had a powerful rival in Lanfranc of Bec. It is said that in order to attract attention he adopted novel views, especially as to the eucharist, rejecting the doctrine of transubstantiation. He was condemned in 1050 and imprisoned. He was protected by Hildebrand, and partly recanted, but soon resumed his old teaching, and continued to do so until 1079, when he was summoned to a council at Rome, and compelled by his former ally —now Pope Gregory VII.—to publicly retract. He then withdrew to an island in the Loire and spent his declining years in solitude and prayer, dying in 1088.

Berenice, the name of several Jewish and Egyptian princesses. 1. BERENICE, the wife of Ptolemy Euergetes of Egypt, who, during her husband's absence on a Syrian campaign, offered up her hair in the temple of Venus to procure his safe return. The tresses vanished, but reappeared as the constellation known by the name of *Coma Berenices*. 2. BERENICE, the daughter of Agrippa I. of Judæa, who married her uncle Herod, and afterwards lived with her brother Agrippa. She took as a second husband Polemo, King of Cilicia, but returned to Agrippa, and was with him when Paul was brought before him at Cæsarea. Titus, captivated by her charms, carried her to Rome, and but for the popular prejudice against the Jews would have married her.

Berenice, the name of many cities in the East, so called in honour of various princesses. 1. BERENICE in Grenaica, now Bengazi (q.v.). 2. BERENICE in the Thebaid on the Red Sea, once a great centre of trade with Asia. 3. BERENICE or Arsinoë on the Straits of Bab-el-Mandeb.

Beresina, or BEREZINA, a tributary of the Dnieper, rising in the north of the Russian province of Minsk, Lithuania. As a stream it is an important artery for floating timber from the country to the open sea. It is memorable in history as the scene of the fatal crossing by Napoleon's army in its retreat from Moscow in November, 1812. On that occasion 12,000 dead bodies were found on the banks of the river, and the Russians captured 16,000 prisoners and 25 pieces of ordnance.

Bereslav, a town on the Dnieper, in the Russian government of Kherson.

Berezna, a town on a tributary of the Desna in the Russian government of Tchernigov.

Berezov, a town of Asiatic Russia in the government of Tobolsk, on the Sosva. It was founded in 1593, and in the 18th century was made a place of banishment. Among those exiled there were Prince Menschikoff in 1727, Prince Ivan Dolgoruki in 1730, and General Osterman in 1742. Also the name of a gold mining village of Asiatic Russia in the government of Perm.

Berg, since 1815 a territory of Prussia, formerly a duchy of Germany, is situated on the right bank of the Rhine. Acquired by Napoleon in 1806, it was made a grand duchy with Murat, Napoleon's brother-in-law, as Grand Duke of Berg.

Bergamo, the name of a town and province of North Italy. The town is fortified, manufactures textile fabrics and iron, and is annually the scene of the largest fair in Italy. The dialect of the people is peculiar, and is affected by the comic characters in Italian comedy. The Bergamasque shepherds, familiar in the Eastern Alps, come from this province.

Bergamot, the name originally of *Mentha citrata*, whence a fragrant oil is obtainable. True essence of Bergamot is obtained from the unripe fruits of the Calabrian Bergamot orange (*Citrus Bergamia*). It is used in perfumery and confectionery. The Lime (*Citrus Limetta*) is known in France as Bergamotte.

Bergedorf, the name of a district and town of Hamburg. Its chief industry is the growing of fruit and vegetables, some of which are sent to the London markets. A railway connects it with Hamburg.

Bergen, a seaport and city on the west coast of Norway and capital of the province of S. Bergen. It is fortified by the castle of Bergenhus (until the end of the 14th century the residence of the Norwegian kings) and by the citadels of Fredericksberg and Sverresberg. It is the second town in the kingdom, and manufactures gloves, leather, porcelain, etc. Its export trade is considerable, comprising timber, fish, fish-roes, cod-liver oil, hides, tar, etc. It is the seat of a bishopric, and besides a cathedral has the interesting church of St. Mary dating from the 12th century. In its museum is an important collection of Norse antiquities. It was founded in the 11th century, and in 1445 the Hanseatic League, driving out British merchants, established a factory and practically controlled the trade of the city until 1558. In 1855 it suffered from an extensive conflagration.

Bergen-op-Zoom, a town in Holland in the province of North Brabant, stands on the Zoom near its junction with the Scheldt. It was formerly a place of great strength, and the scene of many struggles between the Spanish and the Netherlanders. In 1814 it belonged to France and was unsuccessfully attacked by the English under Sir Thomas Graham, afterwards Lord Lynedoch. A curious feature about the tower of the castle is the way its breadth increases as it rises, so that it rocks in a severe wind. It has commodious market-places and does a good trade in anchovies, which are caught in the Scheldt. Its manufactures embrace tiles, bricks, and a fine quality of pottery.

Bergenroth, GUSTAV, historian, was born in 1813 in East Prussia. Appointed assessor to the High Court of Berlin in 1843, he was in 1848 removed to a subordinate position in consequence of his revolutionary sympathies. He left the public service altogether, however, and in 1856 came to England to collect materials in the Record Office for a history of the Tudor period. In 1860 he went to Spain, where he collected for the Master of the Rolls from the archives preserved in Simancas, three volumes of State papers relating to English history. He died in 1869.

Bergerac, chief town of an arrondissement in the French department of Dordogne, is situated on the river Dordogne. It is an enterprising place, manufacturing leather, paper, iron, and articles of clothing. It does a considerable trade with Bordeaux and Libourne in the wines of the district. It is an old town, dating from the 11th century, and during the wars with England was an important fortress. Its inhabitants adopting Calvinist views, Louis XIII. had its fortifications demolished in 1621, while the Edict of Nantes had the effect of exiling many of its citizens.

Bergerac, SAVINIEN CYRANO DE, French writer, was born in 1619 at Paris. He is reputed to have been principal in more than a thousand duels. While still at college he wrote *Le Pédant Joué*, which Molière freely drew from for his *Fourberies de Scapin*. His best known production is the *Histoire Comique des États et Empires de la Lune et du Soleil*, which is credited with inspiring Dean Swift's *Gulliver's Travels*. He died in 1655 at Paris.

Berghaus, HEINRICH, geographer, was born in 1797 at Cleves. Educated at the Gymnasium of Munster, he served both in the French and Prussian armies, being made in 1816 geographical engineer in the war department at Berlin, in 1824 mathematical professor in the architectural academy of Berlin, and in 1836 director of the geographical school in Potsdam. His best known work is the *Physical Atlas*, which forms the basis of Johnston's. He died in 1884 at Stettin.

Bergk, THEODOR, scholar, was born in 1812 at Leipzig. From 1842 to 1869 he acted as professor of philology at the universities of Marburg, Freiburg, and Halle. His chief work was in the preparing of editions of the Greek poets. In 1843 he published the *Poetæ Lyrici Græci*, and in 1872 the first volume of his unfinished *Geschichte der griechischen Litteratur*. He died in 1881.

Bergman, TORBERN OLOF, chemist, was born in 1735 at Katharinaberg, West Gothland. Having studied under Linnæus at Upsala, he became assistant professor of mathematics and physics there, and in 1767 professor of chemistry. He discovered

oxalic acid, and was the first to classify minerals according to their chemical properties. He also experimented in electricity, giving the result in *An Essay on Elective Affinities*. He died in 1784 at Upsala.

Bergmehl, MOUNTAIN MEAL, or FOSSIL FARINA, now generally known as diatomaceous earth, a pulverulent rock of recent origin, accumulated either in fresh or in salt water, and composed entirely of the siliceous frustules of diatoms [q.v.], a group of microscopic algæ.

Bergylt (*Sebastes norvegicus*), a Scorpænoid fish, somewhat resembling a perch in appearance, found in all northern seas as far west as Newfoundland, occasionally visiting the northern coasts of Britain. It is about two feet long, deep red on the back, lighter on the sides, passing into light flesh-colour on the under surface. It is sometimes called the Norway Haddock. There are about twenty other species of the genus, principally from seas of the north temperate zone.

Berhampur. 1. A military station in the Madras Presidency, and the headquarters of the Ganjam district. It is a healthy place and trades in silks and sugar. 2. The administrative centre of the Murshidabad district, Bengal; it used to be a military station. The mutiny of 1857 first burst into flame here.

Beri, an Indian town in the district of Rohtak, Punjab; also the name of a state in Bundelkund. The town is about 40 miles N.W. from Delhi, and has a considerable trade.

Beri beri, the name of a disease prevalent in the East Indies, known in Japan as Kakke, and which, from what is known of its character, appears to be a form of multiple neuritis. The most marked symptoms are burning pains, muscular wasting and paralysis, affecting mainly the legs. It is possibly due to some form of malarial poison.

Berkeley, a town in Gloucestershire, nearly 20 miles from Gloucester. It has a curious church, but is chiefly remarkable for the castle, which is of great historical and antiquarian interest. In 1327 Edward II. was murdered there. The Berkeley peerage takes its title from it. Pop. (1901), 6,277.

Berkeley, GEORGE, Bishop of Cloyne, was born in 1685 at Dysart-on-the-Nore, Kilkenny, where he received his early education, going subsequently to Trinity College, Dublin. Graduating B.A. in 1704, and M.A. in 1707, he was chosen a fellow of his college and ordained a deacon in 1709, the year in which appeared his *Essay towards a New Theory of Vision*. This was followed in 1710 by an amplification of the argument for his new theory in a *Treatise on the Principles of Human Knowledge*, and in 1713 by *Dialogues between Hylas and Philonous*—a more popular exposition. Meanwhile Berkeley had come to London in 1712, and in 1713 was presented by Swift at Court. As chaplain to Lord Peterborough he travelled on the Continent, and again as tutor to the son of Dr. Ashe. In 1721 he was appointed chaplain to the Duke of Grafton, Lord Lieutenant of Ireland, and in 1722 he held the positions of Dean of Dromore, Hebrew lecturer, and senior proctor at the university. In 1723 he was left a legacy by Miss Vanhomrigh, Swift's "Vanessa," whom he met only once at dinner, and in 1724 the rich deanery of Derry fell to his lot. He now became enthusiastic over the founding of a college in the Bermudas for the benefit of the American heathen, and he set out for Rhode Island to carry out his scheme. The subscriptions that had been promised him were not forthcoming, and after a few years of waiting, spent in study, Berkeley came home and published in 1733 *Alciphron, or the Minute Philosopher*, in execution his finest work. It is an examination of the various forms of freethought in the light of his own theory of perception. In 1734 he was made Bishop of Cloyne, where he remained 18 years, retiring in 1752 to Oxford, where, in 1753, he died, and was interred in the cathedral of Christ Church. In addition to the works mentioned, and some mathematical and theological writings, Berkeley also produced in 1744 *Siris, Philosophical Reflections and Inquiries concerning the Virtues of Tar Water*.

The current psychological doctrine that perception, especially by sight, consists very largely of inference based on past experience is due in great measure to Berkeley's theory of vision. But he is more important as the first great English idealist. Locke had held that material objects are known to us only through "ideas" or images caused by their action on our minds through our sense-organs. Berkeley pointed out that this view involved absurdities; material objects are known only in terms of mind, and there is and can be no evidence that they exist apart from mind. But we know that ideas can be excited in a mind, by itself or by other minds (*e.g.* through language). Thus Berkeley concluded that the ideas ordinarily referred to material objects are due to the direct action of a supreme mind, the Deity, wherein they subsist when human beings are not perceiving them. This doctrine received an important sceptical development from David Hume (q.v.), and was combated by Beattie and Reid. It is taken up in the current idealist theory, that the whole system of Nature is essentially rational, the product of spirit, and that instead of mind being a product or function of matter, material phenomena are modes of a Divine mind. But it was long grotesquely misunderstood as implying the non-existence of what is ordinarily called matter. Thus Dr. Johnson professed to refute it by kicking a stone.

Berkeley, JAMES, 3rd EARL OF, was born in 1681, and, having entered the navy, became a captain at the age of twenty. As Lord Dursley he commanded the *Boyne*, 80, at Rooke's action off Malaga in 1704; and in 1706 he commanded the *St. George*, 96, at the siege of Toulon. In 1708 he became a vice-admiral, and was actively employed in the Channel and North Sea, taking several ships from the French; in 1710 he succeeded his father as Earl of Berkeley; in 1717 he was made first Commissioner of the Admiralty; in 1718 he was appointed Vice-admiral of England, and hoisted, by special warrant, a Lord High Admiral's flag, as commander-in-chief of a fleet destined to act against Spain; in the same year he was installed

a Knight of the Garter, and in 1736, after having retired from active service, he died at the Château d'Aubigny, near Rochelle.

Berkeley, SIR WILLIAM, who was born in 1639, entered the navy, and attained the rank of captain in 1662. In 1665, in spite of his youth, he was appointed rear-admiral under the Duke of York, and as such behaved most gallantly in the victory over the Dutch off Lowestoft. He was at once made a vice-admiral, and in the next year led the van during the bloody action off the Goodwin in the early days of June, his flag flying in the *Swiftsure*, 36. In that unfortunate battle he fell, and his ship was taken by the Dutch, who, after embalming Sir William's body, chivalrously sent it to Charles II. in order to ascertain his majesty's wish as to its disposal. It was brought home, and buried in Westminster Abbey.

Berkshire, a county in England, lies in the Thames valley. Its fertile soil overlies solid chalk, and is mostly under cultivation or timber. The richest part, the Vale of the White Horse, is so named from the gigantic figure of a horse cut out in the adjacent hill. This figure, which occupies nearly an acre, is said to have been the work of Alfred the Great in commemoration of a victory over the Danes in 872. In the east part of the county is Windsor forest, and at the south-east Bagshot Heath. The county comprises 20 hundreds, 198 parishes, and 11 poor-law unions. It is chiefly devoted to agriculture, and is celebrated for its breed of pigs. Its manufactures are mainly in agricultural implements, paper, malt, and biscuits. The chief towns are Reading, the capital, Newbury, Maidenhead, Faringdon, Hungerford, Wantage, Wokingham, East Ilsley, Lambourn, and Windsor. Besides the Thames, its tributaries, the Kennet with the Lambourn, the Leddon, the Ock, and the Enborne, flow through the county. In Berkshire are numerous Roman and Saxon remains and Norman churches of the 12th century. Pop. (1901), 283,536.

Berlad, a Roumanian town with considerable trade, on the Berlad river, which is navigable and a tributary of the Sereth.

Berlin, capital of Prussia and of the German empire, in the province of Brandenburg, is situated on the Spree, which divides the city into two parts, united by about fifty bridges. The area of the city is about 24 square miles, and the population (1905) 2,000,000. The streets are, except in the oldest parts, straight and wide, the thoroughfare known as Unter den Linden being one of the finest in Europe. In close proximity to this street are the government buildings, including the emperor's palace, the university, the opera, the cathedral, the old and new museums, and the national gallery. All its public buildings, excepting a few churches and the castle, are modern. It is profusely supplied with monuments of historic figures, the most notable being the equestrian statues of the Great Elector erected 1703, and of Frederick the Great. Among its educational institutions, besides its schools and the University founded in 1809, may be mentioned the Royal Academies of Arts and of Sciences, academies for military, architectural, musical, agricultural, and technical training, and numerous libraries and museums. The chief museums are the Old and the New. Of its five parks the largest is the Thiergarten, covering an area of 370 acres. There are also Zoological and Botanical Gardens. Its largest hospital is the Charité, accommodating 1,500 patients. Its manufactures are varied, embracing steam-engines, sewing machines, pianos, scientific instruments, textile goods, musical instruments, beer, etc. Excepting Leipsic, it is the chief publishing centre in Germany, and has, in addition to numerous other periodicals, upwards of thirty daily newspapers. For transit it is provided with fourteen railways, the Spree with its canals communicating with the Oder and the Baltic, besides the public vehicles common to modern cities. It has a metropolitan and an outer circle railway.

Berlin Spirit, a coarse kind of whisky used in the manufacture of brandy (q.v.).

Berlioz, HECTOR, was born in 1803 near Grenoble. His father was a physician, and wishing his son to follow the same profession sent him to Paris to study medicine. He, however, devoted himself to music and passed the entrance examination at the Conservatoire as a pupil of Lesner. His father being displeased with him for relinquishing medicine, he had to support himself now, which he did by singing in the chorus at the Gymnase. In 1828 he won the second prize at the Conservatoire, and in 1830 the first, called the *Prix de Rome*, which carries with it an income for three years to be expended in musical studies at Rome. He afterwards became a contributor to the *Journal des Débats*, and in 1833 married Henrietta Smithson, an Irish actress. In 1838 Paganini was so struck on hearing the *Symphonie Fantastique*, which Berlioz had composed while still a student, that he presented him with 20,000 francs. In 1839 Berlioz was made a chevalier of the Legion of Honour, and received the appointment of librarian to the Conservatoire. In 1842 he set out upon a musical tour, meeting with enthusiastic receptions wherever he went. In 1852 he went to London and was engaged as conductor of the New Philharmonic Society. In the following year he successfully produced his *Benvenuto Cellini* at the Royal Italian Opera, acting also as musical conductor at Covent Garden. His best known works are the *Symphonie Fantastique*, *Lelio*, *Romeo et Juliette*, and *La Damnation de Faust*. He died in 1869, since which time the popularity of his works has gone on increasing.

Bermondsey, a London district on the south side of the Thames, is the centre of the London tanning trade.

Bermudas, or SOMERS ISLANDS, a group of small islands in the possession of Great Britain, are situated in the Atlantic Ocean in lat. 32° 20′ N., and long. 64° 50′ W. They are named from Juan Bermudez, a Spaniard, who discovered them in 1522, and from Sir George Somers, an Englishman, who was wrecked here in 1609 and established a settlement. Their number is given as being between four and five hundred, yet so small are

they that they cover an area of only about 12,000 acres. The largest is Great Bermuda, or Long Island, the chief town of which, Hamilton, is the governor's seat and a military station. Other of the islands are named St. George's—whose harbour is sufficiently commodious to shelter the whole British Navy, and where is situated the chief military station—Paget's, Smith's, St. David's, Cooper's, Nonsuch, Longbird, etc. The Bermudas were long considered unhealthy, a reputation that is not consistent with their low death rate. Their chief drawback is the want of fresh water, the islanders having to depend upon the rain for their supplies of this necessary. The air is always moist, and the vegetation ever green. The chief products are potatoes, onions, tomatoes, arrowroot, bananas, which articles are exported chiefly to New York, between which and the islands regular steam communication is maintained. Oranges and medicinal plants, like the aloe, jalap, and castor oil plant, also grow. The government of the islands comprises a Governor, assisted by an Executive Council of six members and a Legislative Council of nine members, all appointed by the Crown, and an assembly of thirty-six paid members. There are plenty of schools, free and private, and besides the Church of England, the Presbyterian, Wesleyan, and Roman Catholic denominations are represented. Here Bishop Berkeley (q.v.) settled in 1726 to carry out his mission of christianising the American Indians.

Bermudez, a Venezuelan state, between the Orinoco and the Caribbean Sea, having silver mines.

Bern, the name of a canton and town in Switzerland. The town is situated on the Aar, and comprises well-built houses and regular streets. Its principal buildings are a Gothic cathedral, the church of the Holy Spirit, the federal council hall, the town hall, university, hospital and mint. Among educational institutions are its museum, library, and literary societies. Its trade is brisk, and besides textile fabrics includes watches, clocks, small articles in carved wood, etc. Since 1848 it has been the capital of the whole Swiss Confederation. The canton, covering an area of 2,560 square miles, is the most populous in Switzerland, and its southern part, called the Oberland, is celebrated for its scenery. Here are many of the grandest mountains of the Alpine range, the Jungfrau, Eiger, Wetterhorn, Schreckhorn, and Finsteraarhorn. The central part of the canton is noted for its fertility, while in the north is the Jura range of mountains. The principal river is the Aar, and its lakes are those of Thun, Brienz, Neuchâtel, and Bienne. Iron and even gold is found in some parts, and there are numerous sandstone, marble, and granite quarries; but its chief wealth lies in agriculture and cattle-raising.

Bernadotte, JEAN BAPTISTE JULES, King Charles XIV. of Sweden and Norway, was born in 1764 at Pau. His father was a lawyer, and he too was educated for the bar. In 1780, however, he enlisted as a private in the royal marines, and in 1789 had attained no higher than the rank of sergeant. After the Revolution his promotion was more rapid, and in 1792 he was made a colonel, in 1793 a general of brigade, and soon after a general of division. In the Rhine and Italian campaigns he bore himself with distinction as a soldier, and in the conduct of a difficult embassy to Austria he showed that he was a diplomatist as well. While Napoleon was in Egypt he was appointed minister of war, and though between these two there was considerable rivalry, yet on the establishment of the empire Bernadotte was made a marshal, and in 1806 was created Prince Ponte-Corvo. In 1810, the heir to the Swedish throne dying, Bernadotte was nominated by the Swedish States in Council as the successor to Charles XIII. He immediately devoted all his energies to the service of his adopted country, ascending the throne in 1818. He died, after a successful reign, in 1844.

Bernard, CLAUDE, physiologist, was born in 1813 at St. Julien, in the French department of the Rhone. After studying at Paris he became in 1841 Majendie's assistant at the Collége de France, and in 1854, having achieved distinction by his investigations and discoveries, he was appointed to the general physiology chair in the Faculty of Sciences and member of the Institute. In 1855 he succeeded Majendie in the chair of experimental physiology in the Collége de France, which in 1868 was followed by his appointment as professor of general physiology at the Museum. In the same year he succeeded Flourens in the French Academy, and in 1869 became a member of the Senate. Among his discoveries were the function of the pancreatic juice, the saccharine formation in the liver, and the part played by the nervous system in this process. For his experiments he was thrice awarded the grand prize of the Institute, and was the recipient of many other distinctions. His published writings comprise *Recherches sur les Usages du Pancréas*, *De la Physiologie Générale*, now a text-book in France, *Leçons sur les Anesthesique et sur Asphyxie*, etc. He died at Paris in 1878, and was honoured with a public funeral.

Bernard, JAMES, philosopher, was born in 1658 at Nions, Dauphiné. As a minister he preached the reformed doctrines and was in consequence obliged to retire to Holland. In 1705 he became pastor of the Walloon church in Leyden, and succeeded M. de Valder as professor of mathematics and philosophy in the university there. Among his writings are *Histoire Abrégrée de l'Europe*, *Lettres Historiques*, *Actes de Négociations de la Paix Ryswic*, a continuation of Bayle's *Nouvelles de la Républiques des Lettres*, etc. He died in 1718.

Bernard, ST., Abbot of Clairvaux, was born in 1091 at Fontaines, Burgundy. In 1113, after studying at the University of Paris, he joined the monastery of Citeaux, and so unswerving was his devotion to duty and the rules of religion that he commanded the esteem and veneration of all about him. He was accordingly selected to lead a band of devotees to found a new branch of the order, which he did in 1115 at Clairvaux in Champagne, he himself becoming abbot. His fame and influence grew, and novices were drawn to Clairvaux who afterwards became distinguished men. A proof of his

great influence was furnished in 1130, when he was appealed to to decide the claims of the two rival popes, Anacletus II. and Innocent II. He decided in favour of Innocent, who, though previously banished from Rome, was, at the bidding of St. Bernard, "accepted by the world." Opposed to the doctrines of Abelard, he in 1140 indicted him in a letter to the Pope, and procured sentence of condemnation upon him. He also secured the banishment from Rome and Zurich of Arnold of Brescia. At the council of Vezelai he preached the second Crusade in 1146. The disasters that befel the vast armies that were raised through St. Bernard's preaching, recoiled upon him, as he had predicted success to the Christian arms. He founded about 100 monasteries, and was a prolific writer of epistles, sermons, and theological treatises. He died in 1153 at Clairvaux, and was canonised in 1174.

Bernard, SIMON, engineer, was born in 1779 at Dôle. Educated at the École Polytechnique, when Laplace and Haüy were among the masters, he so profited by the instructions he received that he soon after entering the army became one of Napoleon's most distinguished engineer officers. After the emperor's defeat he withdrew to the United States, where he executed engineering works of hitherto unexampled magnitude — vast canals, the fortification of 4,500 miles of frontier, etc. Returning to France after the Revolution of 1830, he was in 1836 chosen minister of war to Louis Philippe. He died in 1839.

Bernardino, ST., of Siena, was born in 1380 at Massa-Carrara. Of noble parentage, he in 1404 entered the order of the Franciscans. He became noted as a preacher, and in 1438 was made vicar-general of his order in Italy, where he established upwards of 300 monasteries. He died in 1444 at Aquilo, in the Abruzzi, and was canonised six years later by order of Nicholas V. His works, which were published in collected form in 1571, are of a mystical character.

Bernauer, AGNES, daughter of an Augsburg doctor, was in 1432 married to Duke Albrecht without the knowledge of his father, Duke Ernst of Bavaria. When the latter learnt of the alliance he sought to degrade his son. Failing to make Albrecht give way in his devotion to his wife, he had her tried and condemned for witchcraft. She was then drowned in the Danube in 1435.

Bernburg, an ancient city of Anhalt, in Germany, formerly the capital of Anhalt-Bernburg. It is intersected by the river Saale, and is the seat of a considerable trade in grain. Its manufactures embrace snuff, paper, starch, sugar, etc.

Berners, JULIANA, was the daughter of Sir James Berners, who was executed on Tower Hill in 1388. The year of her birth is not known, as indeed is very little else about her. To her authorship are ascribed certain writings on hunting, hawking, and heraldry. The title of the book which was printed in 1486 at St. Albans, near which at Sopewell Nunnery she is said to have been prioress, is *Treatyse perteynynge to Hawkynge, Huntynge, and Fysshynge with an Angle; also a right noble Treatyse on the Lygnage of Cot Armours, endynge with a Treatyse which specyfyeth of Blasynge of Armys.* If Juliana Berners be the authoress of this work, then she is the earliest known female writer in English.

Bernhard, Duke of Weimar, was born in 1604. After signalising himself in the Thirty Years' war on the Protestant side, he became a colonel in the Danish army, joining Gustavus Adolphus in 1631. After the king's death he assumed the chief command. He died suddenly at Neuburg in 1639.

Bernhardy, GOTTFRIED, scholar, was born in 1800 at Frankfort. After studying at Berlin he was appointed director of the Philological Seminary at Halle. He contributed several valuable works to philological science, including a history of Greek literature. He died in 1875.

Berni, FRANCESCO, poet, was born about 1490 at Lamporecchio, Tuscany. After a period spent at Florence he removed to Rome, and there became celebrated for his witty effusions. In 1530, returning to Florence, he was made a canon in the cathedral there. In 1536 he died, supposed by some to have been poisoned by Duke Alessandro de Medici. He is the chief of Italian comic poets, and so pungent was his wit that comic poetry was called after him *Versi Berneschi*. His chief work was the remodelling of Boiardo's *Orlando Innamorato*.

Bernicia. [NORTHUMBRIA.]

Bernier, FRANÇOIS, French traveller, was born at Angers, France. After studying medicine at Montpellier university, he visited Palestine, Egypt, and India, residing at the court of Aurungzebe as his physician for twelve years. In 1670, on his return to France, he published a popular account of his travels, which have often been republished and translated into different languages. He visited England in 1685 and died in Paris in 1688.

Bernina, PIZ, a Swiss mountain 13,290 feet above sea-level, in the canton of Grisons. It is remarkable for its glaciers, and its summit was first reached in 1850.

Bernini, GIOVANNI LORENZO, artist, was born in 1598 at Naples. After he had produced at the age of 18 his celebrated sculptured group of *Apollo and Daphne*, he enjoyed the patronage of Cardinal Maffeo Barberini, who on becoming Pope Urban VIII. appointed Bernini as his architect. Among his best works in this capacity was the great colonnade of St. Peter's. In 1665 at the invitation of Louis XIV. he visited Paris to compete in designs for the Louvre. Perrault's were considered superior to his, and so he limited his attention to sculpture. In 1680 he died at Rome, leaving a fortune of upwards of £100,000.

Bernouilli, DANIEL, second son of John Bernouilli (q.v.), was born February 9th, 1700, at Gröningen. After studying medicine he turned to mathematics, of which he was appointed professor at St. Petersburg in 1725. In 1733 he withdrew to Basel, where he was professor first of anatomy and botany and afterwards of experimental and

speculative philosophy. He published several mathematical treatises, the chief being his *Hydrodynamica*, (1738), the first work on that subject. In his later years he directed his attention to the study of probabilities with special reference to social and economic matters. He was a member of the Academies of Berlin, Paris, and St. Petersburg, and F.R.S. of London. He died in 1782.

Bernouilli, JAMES, mathematician, was born December 27, 1654, at Basel. Though destined by his father for the church he developed a passion for mathematics, and soon distinguished himself in this science. On returning in 1682 from a visit to England, where he met Boyle, Hooke, Stillingfleet, and other distinguished men of science, he opened in Basel a seminary for the teaching of experimental physics. In 1687 he became professor of mathematics in the University of Basel, whither through his influence foreign students were attracted. He and his brother John (q.v.) were the first two foreigners that were appointed associates of the Paris Academy of Sciences; and by the special request of Leibnitz they were made members of the Berlin Academy. In 1696 a problem he proposed relative to the properties of isoperimetrical figures led to a quarrel between the brothers, John being held to have evinced jealousy at James's superiority. By his triumphs in the severe science he is esteemed as worthy to be ranked with Newton and Leibnitz. Among his published works were *A Method of teaching Mathematics to the Blind*, *Universal Tables on Dialling*, *Conamen Novi Systematis Cometarum*, *De Gravitate Ætheris*, etc. He also wrote verses in French, German, and Latin. He died in 1705, and on his tomb, as he requested, the logarithmic spiral was engraven with the inscription, *Eadem mutata resurgo*.

Bernouilli, JOHN, like his brother James (q.v.) also a mathematician, was born July 27th, 1667, at Basel. After about a year in the commercial world at Neufchatel he returned to his studies at Basel, being aided by his elder brother, James. Mathematics and chemistry were his special subjects; he also studied medicine, graduating M.D. in 1694, and immediately afterwards was appointed to the mathematical chair at Gröningen. Here he remained until the death of his brother James, when he was appointed to the chair in the University of Basel thereby vacated. His mathematical discoveries were numerous and comprised the exponential calculus and the curve of swiftest descent. His collected works were published in 1742, and in 1745 his correspondence with Leibnitz. He died January 1st, 1748.

Bernouilli. Other members of this celebrated family that achieved distinction were: NICHOLAS, eldest son of John, born in 1695, and died 1726; JOHN, youngest son of John, born 1710, died 1770; NICHOLAS, cousin of the preceding, born 1687, died 1759; JOHN, grandson of the first John mentioned, born 1744, died 1807; JAMES, younger brother of the preceding, born 1759, drowned in the Neva 1789. This celebrated name, Bernouilli, it is said, continuously appeared on the list of Foreign Associates of the French Academy from 1699 to 1790.

Beroe is the type genus of Beroidæ, a family of jellyfish of the order CTENOPHORA; each *Beroe* consists of a small egg-shaped jelly-like mass. It differs from the common *Pleurobrachia*, which it most resembles, by the absence of the long tactile filaments. [JELLY-FISH.]

Berosus, a Chaldean priest, lived in the time of Alexander the Great. He translated a history of Babylonia into Greek, from the Creation down to his own time. Only fragments of this work now exist, and these have been preserved to us in the pages of such writers as Josephus and Eusebius. They were first collected and published by Richter in 1825 in Germany.

Berri, CHARLES FERDINAND DE BOURBON, DUC DE, second son of Charles X. of France, was born 1778 at Versailles. In 1801 he came to England, remaining thirteen years and marrying an English lady by whom he had two children. This marriage, for reasons of state, was cancelled in 1814, and in 1816 he married Princess Caroline Ferdinande Louise of Naples. In 1820, while leaving the opera house, he was assassinated by one Louvel. Seven months after this his son Henri, Duc de Bordeaux, or the Comte de Chambord, was born.

Berry, strictly speaking, a succulent, inferior, syncarpous fruit, neither horny exteriorly as in gourds [PEPO], nor having a core as in the pome of the apple, hawthorn, or service-trees. A gooseberry, banana, or prickly pear are true berries; but the term is often more loosely used, either for similar superior fruits, such as the tomato or grape [NUCULANE], or even for apocarpous drupes; for etærios of drupels, such as the raspberry; or for other fruits of quite different structure, such as the strawberry; or even for the united fruit-structures of several flowers, as in the mulberry.

Berry, SIR EDWARD, a distinguished naval officer, was born in 1768, entered the Royal Navy in 1779, became a lieutenant in 1794, and served with Nelson in the *Agamemnon* in 1796, from which date the great admiral became his fast friend. Attaining the rank of commander, Berry was present as a volunteer on board the *Captain* at the battle off Cape St. Vincent, and at Nelson's side he boarded the *San Josef* and *San Nicholas*. He was promoted to be captain in 1797; was Nelson's flag-captain at the battle of the Nile; and, being sent home with despatches in the *Leander* after that victory, fell with her into the hands of the enemy. He commanded the *Foudroyant* at the capture of the *Généreux* and *Guillaume Tell* in 1800; and the *Agamemnon* at Trafalgar in 1805, and at Duckworth's victory in 1806. In the latter year he was made a baronet; in 1815 a K.C.B.; and in 1819 a colonel of Royal Marines. He became a rear-admiral in 1821, and died in 1831.

Berryer, PIERRE ANTOINE, politician, was born in 1790 at Paris. After receiving his preliminary education he adopted the legal profession, though he leaned to a career in the church. Among his first work was the defending of Marshal Ney

and other of Napoleon's generals. In 1830 he was elected a member of the Chamber of Deputies, and shortly before the fall of Charles X. made an effective speech on behalf of the policy of that king. After the July revolution he was the only member of the Legitimist party that retained his seat. In 1832 he left Paris to meet the Duchess of Berri on her landing at Marseilles and so prevent her from organising a rising on behalf of her son, the Count of Chambord. He failed, and was arrested as a participator in the insurrection. He was soon released, however. Thereafter he signalised himself by his defence of Chateaubriand in 1833. In 1840 he defended Louis Napoleon after his attempt at Boulogne, and in 1843 he made a visit to the Count of Chambord in London, acknowledging him as the lawful king of France. He was a member of the National Assembly of 1848, and was among those who vigorously protested against the *coup d'état* of December 2, 1851. Withdrawing from parliamentary life he was received at the French Academy in 1854; after twelve years' retirement he again, however, appeared as a deputy to the legislative body in 1863. The leading achievement of his later life was his defence of Montalembert in 1858. In 1865 he visited Lord Brougham and was entertained by the benchers of the Temple and Lincoln's Inn. He died in 1868.

Bersaglieri, so named from the Italian *bersaglio*, aim, or target, are the riflemen or sharpshooters of the Italian army. They were organised by General de la Marmora upon the model of the French *chasseurs-à-pied*, and they now number twelve regiments, each of three battalions of four companies, with a depôt, and with a total normal strength of about 42,000 men. In war-time, this, by the addition of the militia, may be increased to 106,000. The Bersaglieri are distinguished by wearing a soft felt hat decorated with a voluminous plume of cock's feathers.

Berserker, a Scandinavian mythological hero, was the grandson of the fabled eight-handed Starkader and Alfhilde. He slew in battle King Swafurlam, by whose daughter he had twelve sons who inherited his name. He went into battle without armour, hence the name Berserker, popularly derived from *ber*, bare, and *serker*, shirt of mail. More probably, however, it means "bear-shirt," and is either connected with TOTEMISM (q.v.), or affords a parallel to the WEREWOLF (q.v.) myth.

Bert, PAUL, was born at Auxerre in 1833, and after a training for the legal profession took to physiology, and in 1863 became assistant to Claude Bernard, the famous professor at the College of France. In 1867 he was elected to the chair of physiology at Bordeaux, and in 1869 filled the same post in Paris. On the fall of the empire he came forward as a politician, was returned to the Chamber of Deputies, and as Minister of Education and Public Worship, under Gambetta, he was active in suppressing the clerical schools. He was sent out as governor to Tonkin in 1886, and died very soon afterwards of fever. He wrote a good deal on scientific and educational subjects, and his little book for children, *La Première Année d'Enseignement Scientifique*, has been translated into several languages.

Bertha, the name of many royal and noble ladies who have played a part in the history of Teutonic nations. [BERCHTA.]

1. BERTHA, ST., daughter of Charibert, King of the Franks, married Ethelbert, King of Kent, and was instrumental in converting England to Christianity. 2. BERTHA, Long-Foot, daughter of the Count of Laon, who married Pepin of France, and became the mother of Charlemagne. 3. BERTHA, daughter of Conrad, King of Burgundy, and wife of Robert, King of France, but divorced from him (998) by Pope Gregory V. because she was related to her husband in the fourth degree.

Berthelot, SABIN, born at Marseilles in 1794, devoted his life to travel and the study of natural history. His most valuable work treats of the Canary Islands, and was written in conjunction with Mr. Barber-Webb. Many papers on physical geography and kindred subjects were contributed by him to scientific periodicals.

Berthier, LOUIS ALEXANDER, Prince of Wagram and Neufchatel, was born in 1753. Like his father he became a soldier, and served in America under Lafayette and Rochambeau. In 1789 he commanded the National Guard at Versailles, and favoured the escape of the royal family. After fighting for the republic in the Vendée, he joined Bonaparte as chief of the staff in the Italian campaign of 1796, and henceforth was the closest and most devoted friend of the future emperor, who made him his secretary of war after the affair of the 18th Brumaire. He played a part at Austerlitz and Wagram, and all the important engagements until the banishment of his master to Elba. He then reconciled himself to the Bourbons, and refused to return to his allegiance during the Hundred Days, retiring to Bamberg, his wife being a daughter of the King of Bavaria. Here he was found dead on the pavement in front of the palace a few days before the battle of Waterloo. Some assert that he killed himself through remorse or madness, others that he was murdered. He left several interesting records of events in which he was mixed up.

Berthollet, CLAUDE LOUIS, was born in 1748 in Savoy. Educated as a physician, he abandoned the profession to study chemistry, and rapidly rose to eminence, being a member of the Academy of Sciences, professor at the Normal and Polytechnic schools, and one of the founders of the Institute. The republic employed him together with Monge in making gunpowder and in plundering the art galleries of Europe. He accompanied Bonaparte to Egypt, and was appointed by him a senator in 1805, but this did not prevent his accepting a peerage under the Restoration. Apart from his theories, not always verified, but clearly argued out in his *Chemical Statics*, he did much to improve the manufacture of steel, soap, and dyes. He discovered chlorate of potash and fulminating silver, and followed up the investigations of Lavoisier and Priestley. He died in 1822.

Bertholletia, a genus of lofty trees 100 to 150 feet high, seldom branching except near the top, belonging to the order *Lecythidaceæ*, and native to northern South America. Its seed is the Brazil nut (q.v.).

Bertin, Louis François, called Bertin the Elder, was born in Paris in 1766, and in 1799 established the *Journal des Débats*, which under his able management secured the co-operation of the ablest literary men of the day. His suspected devotion to the Bourbons led to his expulsion from France during the greater part of Napoleon's career, but in 1815 he returned permanently. In 1824 he combated the unconstitutional policy of Charles X., and gave his firm support to Louis Philippe. He died in 1841.

Bertin, Nicolas, an eminent French painter, pupil of Jouvenet and Boullouque, was born in 1667, and died in 1736. His subjects were mainly classical and religious.

Bertrand, Count Henri Gratien, was born in 1773, and served under Napoleon in Egypt, at Austerlitz, Friedland, Wagram and Moscow, becoming ultimately Grand Marshal of the Household. He bravely covered the retreat of the French from Leipzic, and contested the advance of the Allies to Paris. He then shared the emperor's exile both at Elba and St. Helena. On his return to France in 1821 he was restored to his rank and honours, and sat as a deputy for many years. In 1840 he went to St. Helena with the Prince de Joinville to bring over Napoleon's remains. He died in 1844.

Bertrand, Élie, was born in the Pays du Vaud in 1712, and became a distinguished Protestant preacher and writer. In the latter years of his life he adopted with ardour the study of geology, and was one of the early pioneers in that science. He wrote several works on the structure of mountains, on earthquakes, and on fossils, and died in 1777.

Berwick, a county of Scotland, lying N. of Roxburghshire and S. of Haddington, with the German Ocean as its boundary on the E. It has an area of 457 square miles, and is roughly divided into three districts: Lauderdale, the valley of the Leader; Lammermuir, a bleak hilly tract having an average elevation of 1,000 feet; and the Merse, a level reach to the S. and E. of these hills. It is well watered by the Tweed and its tributaries, the Whiteadder, the Leader, the Eden, the Leet, etc., and by the Eye, which falls into the sea. Owing to the varying geological characteristics the soil is much diversified, but the industry of the people and the system of long leases have greatly enhanced the agricultural wealth of the county. Minerals are not worked profitably, and there are no important manufactures. The coast is rugged and inaccessible save at Eyemouth, an indifferent harbour, so that little external commerce exists. Its salmon-fishery, however, yields a good return, and a considerable quantity of sea fish is taken by the littoral population. Berwickshire boasts many places of romantic or historical interest, such as Dryburgh Abbey, Coldingham Priory, Fast Castle, home of the Bride of Lammermoor, the Rhymer's Castle, Hume Castle, Pict's House, Dunse Castle, and Ladykirk. Greenlaw is the county town. Pop. (1901), 30,824.

Berwick, Duke of, James Fitz-James (1670—1734), the illegitimate son of James II. He won fame as a soldier on the Continent, and was present with his father at the battle of the Boyne. He was made a marshal of France and a grandee of Spain.

Berwick, North, a port in Haddingtonshire, Scotland, on the Firth of Forth, 22½ miles N.E. of Edinburgh by rail. It has an indifferent harbour, and a small trade, but the climate, the sands, and the golf-links attract many visitors.

Berwick-upon-Tweed, a port and municipal and parliamentary borough of Northumberland, on the N. bank of the Tweed at its mouth, but it now includes the suburbs of Tweedmouth and Spittal on the opposite shore. Of its foundation nothing certain is known, but at the end of the 10th century it had become an important stronghold on the Scottish frontier, being made a royal burgh by Alexander I. It frequently changed hands during the struggle between the two countries, but in 1296 was sacked by Edward I. and never recovered from the blow. About this time the stone walls were built, but those that now exist date from Elizabeth. It was not till 1482 that the English finally became masters of the town, which with its liberties extending over 8 square miles maintained a curiously isolated existence, almost like an independent principality, until the union. It was still a distinct county in 1835, when the Municipal Reform Act incorporated it with Northumberland, but the title is retained in certain proclamations. In 1885 its parliamentary representation was reduced to one member. In spite of its antiquity the town is well built, open, and clean, having a fine site on a plateau above the river, which is spanned by a fine stone bridge and a railway viaduct. Of old buildings there are but few, except the ruins of the castle. The parish church dates from Cromwell, and the handsome town-hall was completed in 1760. The harbour is not very good, though improved in recent years, and the trade is limited to local products and demands, but there is a very large fishing fleet. By the original charter the Corporation owns all lands within the liberties that are not private property, and these lands produce a considerable revenue. Pop. (1901), 13,437.

Beryl, a double silicate of aluminium and the rare metal beryllium or glucinum (Al_2O_3. $3SiO_2$ + 3BeO SiO_2). It crystallises in hexagonal prisms with basal planes, often deeply striated longitudinally. These crystals sometimes reach enormous dimensions, being found at Grafton, New Hampshire, four to six feet long, and weighing 2,000 to 3,000 lbs. The hardness of the mineral ranges from 7·5 to 8, and its gravity from 2·63 to 2·75. It is brittle and has sometimes a conchoidal fracture: its streak is white; its lustre, vitreous or resinous; and it is almost infusible. It may be transparent and colourless; but is more often only translucent and bluish-green (*aquamarine*) or bright green (*emerald*), from the presence of a trace of oxide of chromium. Large crystals are generally opaque.

Beryls were worked by the ancient Egyptians, and engraved as gems by the Greeks and Romans. Good gems are obtained at Mursinsk and Nertchinsk in the Urals, Canjargum in Hindustan, and Rio San Matteo in Brazil; but the locality for the finest emeralds is Muzo, about 70 miles from Santa Fé de Bogotá, New Granada.

Beryllium, a lustrous white metal (sp. gr. 2·1, at. wt. 9·1, symbol Be), does not occur free in nature, and it is difficult to obtain the metal from its compounds. It occurs as silicate in phenacite, as aluminate in chrysoberyl, and as silicate together with aluminium silicate in emerald and beryl. Its oxide, BeO, is known as berylla. The metal itself is also called glucinum.

Berzelius, JÖNS JAKOB, was born in Sweden in 1779. He showed at first an inclination towards natural science, but on going to the University of Upsala threw himself zealously into the study of chemistry under Afzelius. In 1800 he was called to Stockholm as assistant to Dr. Hedin, and soon after began to lecture on physics, directing his attention specially to the bearing of chemistry on physiology. He early appreciated Volta's discoveries, sharing with Davy the honour of propounding the electrochemical theory. After several valuable treatises on physics, chemistry, and mineralogy, he produced in 1810 his great work on *Fixed Proportions and the Weights of Atoms*, and this was followed by a *Treatise on the Blowpipe*, which led to the classification of minerals according to their chemical constituents. For this the Royal Society of London awarded him the Copley medal. He gave up lecturing in 1832, but went on with his investigations. In 1842 he was nearly killed by an explosion, but his death did not occur until 1848.

Besançon (classic *Vesontio*), the capital of the department of Doubs, France, on the river Doubs, 45 miles E. of Dijon, is a town of the highest antiquity, and was in Cæsar's time the chief place of the Sequani. Under the emperors it rose to great prosperity, and its streets still bear Roman names, whilst the remains of a triumphal arch, an amphitheatre, and many other buildings still exist. From the 12th to the 16th centuries it belonged to Germany. By the treaty of Westphalia it was assigned to Spain. Louis XIV. took it twice, and it finally became French in 1678 after the peace of Nimeguen. Since then it has been besieged more than once. The citadel stands 400 feet above the river, and the fortifications are strong. There are an arsenal, barracks, royal college, archbishop's palace, library, academy of painting, besides the usual institutions of a provincial capital. The cathedral is Gothic, and the palace of Granvella, Charles V.'s minister, is an interesting monument. Watches, porcelain, and carpets are the chief manufactures, and a brisk trade goes on with Switzerland.

Besant, SIR WALTER, was born at Portsmouth in 1838, and educated for the church at King's College, London, and Christ's College, Cambridge. He turned his attention, however, to literature, and in 1868 brought out a volume of *Studies in Early French Poetry*. He was secretary to the Palestine Exploration Fund, and assisted Professor Palmer (whose memoirs he afterwards wrote) in writing his *History of Jerusalem*. In 1871 he began jointly with Mr. James Rice to cultivate the field of fiction. The two partners published eleven novels, of which *The Golden Butterfly* and *Ready-Money Mortiboy* have been the most popular. Then Mr. Rice died, and Mr. Besant produced on his own account *All Sorts and Conditions of Men*, *The Revolt of Man*, *Dorothy Forster*, *The Chaplain of the Fleet*, *Beyond the Dreams of Avarice*, *The Master-Craftsman*, *The City of Refuge*, *A Fountain Sealed*, and other stories. Sir Walter Besant devoted much energy to the protection of authors against publishers, whom he regarded as their natural enemies. He founded the Society of Authors, and also a journal to advocate his opinions. He was knighted in 1895. He died in 1901.

Besika Bay, an inlet on the coast of Turkey in Europe, near the entrance to the Dardanelles, only remarkable as having been the station of the British fleet in 1878, when war appeared imminent with Russia.

Bessarabia, a government of European Russia, with an area of about 15,000 square miles, lying between Moldavia and the river Dneister, and extending along the coast of the Black Sea from the mouth of the latter to the Kilia mouth of the Danube. Formerly a part of Moldavia, this strip of territory was held by the Turks from 1484 to 1812, when it was ceded to Russia, and its boundaries have often formed a bone of contention between the two neighbours. The Berlin Treaty of 1878 extended the share of Russia to the Pruth. The country, low, swampy, and intersected by watercourses in the Bujak steppes towards the sea, trends up inland to the fringe of the Carpathians, and becomes hilly and wooded. The so-called wall of Trajan divides the two districts. The chief products are cereals, hemp, flax, tobacco, wine, and cattle, and the principal towns are Akerman, Bender, Kishenau, and Ismail.

Bessarion, JOHANNES, was born at Trebizond in 1395 (or 1389). He became archbishop of Nicæa in 1437, and went to Rome in order to negotiate for the union of the Eastern and Western churches. Pope Eugenius made him a cardinal, and gave him preferment and employment. Though raised to the nominal patriarchate of Constantinople in 1463, he spent his life chiefly in Italy, where he was one of the great promoters of the revival of letters, being a learned Greek scholar. He translated Aristotle's *Metaphysics* and Xenophon's *Memorabilia*, and endeavoured to reconcile the systems of Aristotle and Plato. He died at Ravenna in 1472, broken-hearted, it is said, by an insult received from Louis XI. of France, to whom he had been sent as an envoy.

Bessel, FRIEDRICH WILHELM, born at Minden in 1784, and brought up as a merchant, was attracted during a voyage to the study of navigation and astronomy. Some observations which he published brought him into notice, and in 1810 he was made director of the new observatory at Königsberg.

In 1818 he produced his *Fundamentum Astronomiæ*, a work that placed him in the first rank of astronomists. He was especially skilful in the use of delicate instruments, as was shown by his determination of the parallax of 61 Cygni. He died in 1846.

Bessemer, Sir Henry, was born at Charlton, Herts, in 1813, his father being an artist of Breton origin. His inventive talents showed themselves early by the construction of an apparatus to prevent the fraudulent use of obliterated stamps. Several profitable patents, *e.g.* "Bessemer's Gold Paint," were taken out by him at this period. It was not, however, till 1856 that he perfected the system which bears his name for manufacturing steel by introducing oxygen into molten iron, and so eliminating the carbon. This discovery revolutionised the iron and steel trades, and brought Bessemer a great fortune and high honours. In 1871 he was chosen president of the Iron and Steel Institute, and in 1879 was made F.R.S. and knighted. He died in 1898.

Bessemer Process, for the manufacture of steel from pig-iron, was introduced by Sir Henry Bessemer in 1856. Its introduction has almost revolutionised the steel trade, nearly thirty times as much steel being now turned out as was produced prior to its invention, and at about one-fifth the cost per ton. Nevertheless, the finer steels have still to be worked up in other ways, for reasons which are evident when the Bessemer method is explained. The principle is very simple. Pig-iron contains from 2 to 5 per cent. of carbon, besides small quantities of numerous other substances, such as silicon, sulphur, phosphorus, manganese, etc. Steel is essentially a compound of iron with ·1 to 1 per cent. of carbon, though several other elements are invariably present in small quantity and considerably affect the nature of steel. Hence if we can properly reduce the quantity of carbon in pig-iron, and also eliminate some of the other ingredients, we shall obtain steel.

This is effected in the Bessemer process by a special method of oxidation. Molten pig-iron is run into a *converter* lined with ganister, a siliceous reducer. Then air is forced through the liquid metal from below by means of blowing-engines. Ordinary converters contain 8 or 10 tons of metal, and the process lasts 20 to 30 minutes. The progress of the reduction is noted by the appearance of the flames issuing from the converter. If the pig-iron be pure, as with Swedish iron, the process is stopped when the correct carbon percentage is reached. If less pure, it is continued till all the carbon is oxidised, and very nearly all the other ingredients, though practically all the phosphorus and sulphur in the original crude metal still remain. When this condition is reached, a definite amount of carbon and other matter is supplied by introducing a known weight of *spiegeleisen*, which is a special cast-iron of determinate constitution. In this way a steel may be made with the required percentage of carbon, but with the other ingredients to some extent beyond control. The metal is condensed subsequently by the steam-hammer and the rolling-mill. [Steel, Basic Process.]

Bessières, Jean Baptiste, Duc d'Istria and Marshal of France, was born of humble parentage in 1768, and entered the army as a private soldier. In the battles of Roveredo and Rivoli his courage was witnessed by Bonaparte, who advanced him rapidly and took him to Egypt in command of a brigade. In the second Italian campaign he won the battle of Marengo by a well-timed cavalry charge. After serving honourably at Austerlitz, Jena, Eylau, and Friedland, he was sent to Spain in 1808, won several engagements against the Spaniards, and was recompensed with a dukedom. He commanded the cavalry of the Guard in the beginning of the Leipsic campaign of 1813, and was killed the day before the battle of Lutzen.

Bestiary, the name formerly given to a book which treated of animals.

Bestucheff, Alexander, born 1795, entered the Russian army, and with his brother Michael formed a conspiracy against the Emperor Nicholas. For this offence Michael was executed, and Alexander transported to Siberia (1826). Subsequently he was allowed to join the forces in the Caucasus, where he was killed in 1837. He was one of the first of the romance writers of modern Russia, and excelled in portraying military life.

Bestucheff-Riumin, Alexis, Count of, was born at Moscow in 1693. He was employed as a diplomatist by Peter I. and Anne, and the minister Biron was his supporter. Elizabeth made him chancellor, and he negotiated the peace of Abo. In 1758 he was banished on a false charge of treason, but was restored to favour by Catherine II., and died in 1766.

Betel-nut, the seed of *Areca Catechu*, a palm cultivated in tropical Asia. It resembles a nutmeg in size, in colour, and in its "ruminate" albumen which gives it a mottled appearance internally. Pieces of this nut are rolled up with a little lime in leaves of *Piper Betel*, the Betel-pepper, and chewed by the natives. The pellet is hot, acrid, aromatic, and astringent, tinges the saliva red, and stains the teeth. Areca-nut is now sometimes prescribed as a tænifuge. Its charcoal is used as tooth-powder.

Bethany (Heb. *the house of dates*), a village on the eastern flank of the Mount of Olives, 2,200 feet above the sea-level. It is frequently mentioned in the New Testament and was the home of Lazarus, and his sisters, Martha and Mary. The modern name, Lazarieh, preserves this fact. During the Crusades it became the seat of a monastic establishment, which dragged on a decaying existence up to a recent date.

Bethel (Heb. *the house of God*) was an ancient town, originally Luz, on the confines of Benjamin and Ephraim, about 11 miles N. of Jerusalem. According to one account it was renamed by Jacob on his receiving there the promise of Canaan, and when the tribes occupied the Promised Land it was the temporary resting-place of the Ark. Later on

several of the kings made it the centre of idolatry, but this fact has not prevented the word being applied freely by Nonconformists to designate a place of worship. Large ecclesiastical buildings were subsequently raised upon the spot, but Beitin, as it is now called, displays only a heap of deserted ruins. The name was frequently associated with that of Dan as representing two extreme points.

Bethesda (Heb. *house of mercy?*) was a pool used as a public bath in the sheep-market near the Temple in Jerusalem. It is identified with Birket Israel close to St. Stephen's Gate. At certain hours when "an angel troubled the pool" (John v.), the water possessed miraculous powers of healing.

Bethlehem (Heb. *house of bread*), a small but very ancient town about six miles from Jerusalem on the road to Hebron. It was known in the time of the patriarchs as Ephrata, and is mentioned in the story of Ruth. David was born here, and Rehoboam fortified the place as a station on the way to Egypt. It had sunk into insignificance, when it became famous for ever as the birth-place of the Saviour. Hadrian desecrated the scene of the Nativity by setting up a temple and grove to Adonis, but the Empress Helena built on the site a majestic basilica which is still preserved. Around it sprang up Greek, Latin, and Armenian convents. In a neighbouring grotto Jerome passed his days translating the Scriptures. The Crusaders founded a bishopric here, which was long preserved in name. The inhabitants of the village are Christians.

Bethlehemite, a monastic order founded in Guatemala about 1659, under the patronage of Our Lady of Bethlehem, and at one time widely extended in Spanish America, but now represented only by a few monasteries in Central America. Their special functions were the care of hospitals and schools. An order with a similar name and object existed at Cambridge in the 13th century. The name was also applied to a military order established by Pius II., 1459, to defend Europe against the Turks, and to the followers of John Huss—in the latter case from Bethlehem church in Prague, where he preached.

Bethlen-Gabor was born in Transylvania in 1580. With the aid of the Turks he rose against Prince Gabriel Bathori, his benefactor, and seized his throne in 1613. He then roused the Hungarians against Austria, and in 1618 assumed the title of king of Hungary. In the Thirty Years' war he assisted Bohemia to revolt, but was compelled by Tilly to renounce his sovereignty. He died in 1629 just as he was preparing to renew hostilities.

Bethnal Green, a parish of 750 acres in the East End of London, which in 1885 was made a parliamentary borough, returning two members. Lying beyond Spitalfields, it boasted in the time of Pepys pleasant gardens and country houses. It is now the most poverty-stricken and squalid quarter of the metropolis, but it is the scene at present of many beneficent experiments for the improvement of the humbler classes, and among these the Bethnal Green Museum may be regarded as the most successful. Pop. (1901), 129,681.

Bethsaida, a city in Palestine, on the N.E. shore of the Sea of Galilee, near the point where the Jordan has its issue. Philip the Tetrarch called it Julias and beautified it. Though the home of Peter, Andrew, and Philip, and often visited by Jesus (John i. 44; Mark viii. 22), the city profited little by its advantages, and was specially denounced by Christ (Luke x. 13).

Bethune, a fortified town in the department of the Pas de Calais, France, 16 miles N.N.W. of Arras. Situated on a rock above the river Brette, it is an unattractive place, but has a fine Gothic church and the usual public institutions. It was founded in the 11th century, taken by France in 1645, recaptured by the Allies in 1710, and restored at the peace of Utrecht. There are manufactories of linen, cloth, and beer, and some trade is done in agricultural produce.

Betony, *Stachys Betonica*, a British plant belonging to the order *Labiatæ*, common on heaths and in woods. Its pairs of oblong, crenate leaves, stalked below, but sessile where they occur between the interrupted spike of whorled flowers, are characteristic. The flowers are crimson, pink, or white. It is a popular anthelmintic.

Betsimisarakas, a main division of the Malagasy race, occupying a great part of the east coast of Madagascar, and extending round to the north-west side, where their domain is conterminous with that of the Sakalavas. The Betsimisarakas are politically subject to the dominant Hova nation, whom they resemble in appearance and language. Their chief subdivisions are the Sihanakas, Tanalas, Tankays and Ikongos; total population 300,000. *See* Bishop Kestell Cornish, *Tour in the Madagascar*, 1877.

Betterton, THOMAS, born at Westminster in 1635, was the son of one of Charles I.'s cooks, and was apprenticed to a bookseller, who turned theatrical manager. Betterton appeared at the Cockpit in Drury Lane in 1659, and he was soon after engaged by Davenant. His abilities as a tragedian won him the patronage of the king, who sent him to see how plays were mounted in France, and shifting scenes were introduced as the result of his visit. In 1693, though his fame was at its height, he was plunged in poverty, but funds were provided to enable him to open a theatre in Lincoln's Inn Fields. He does not seem to have prospered, and at the age of seventy he retired. After this he performed occasionally, and his impersonation of Hamlet was noticed in the *Tatler*. He died in 1710. As an interpreter of Shakespeare he undoubtedly worked upon the lines of the great master's contemporaries, and handed down the earliest traditions of the English stage, but it is impossible to form a real estimate of his merits. His friend Cibber recorded some of the events of his life.

Betting (probably from *abet*, to aid, to support), the staking of money or some valuable article on

Photo. Bonfils.

N. E.—5

BETHLEHEM.

the issue of some event or contest. In some form or other it is very ancient; it may originally have had some religious import, and it has been conjectured from a passage in Homer (*Iliad* xviii. 505) and certain features of early Roman legal procedure that fines in legal proceedings had their origin in the staking of money by the respective parties to prove the truth of their assertions. Horse-racing has been the chief field of betting in England for more than a century. Such betting may be divided into bookmaking and backing. The former consists in laying odds successively against all the horses entered in a given race, or as many as possible, it being theoretically the bookmaker's object to lay an equal sum against each. The latter, which must always be a losing process in the long run, consists simply in taking the odds offered against a certain horse entered for a race. The bookmaker's profit consists in the sums lost by the backers of the losers, minus the sum he has to pay to the backer of the winner; and the former, obviously, tends to be larger the more starters there are—or rather the more of them he is able to back. Could he always lay an equal sum against each, he must win in the long run. Bookmaking arose from the difficulty backers felt in finding anyone to bet with; it has now become a less profitable trade than formerly, there being more bad debts; and the betting on great races not now commencing so long beforehand as formerly, there is less opportunity to lay against a large number of the starters. "Hedging" (laying odds against a horse which the layer has previously backed at longer odds) is a mode of minimising the risk involved in backing. Betting on elections is common enough in the United States (though, at least in some States, its discovery entails disfranchisement) and in parts of England; and various forms of sport have from time to time attracted the professional betting man, particularly yacht racing, sometimes pigeon-shooting, and, it is said, football. Betting is sometimes spoken of as an Anglo-Saxon vice, and certainly betting on horse-races is nowhere so highly developed as in England and Australia. In France, the Argentine Republic, and the United States "the turf" is to a great extent an introduction from England. But it must be remembered that other nations have their own forms of gambling—the lottery, for instance.

English Legislation against Betting. Gambling debts are not recognised by law. Betting houses, where lists of the current odds were exhibited and money taken in advance, were made illegal in 1853 by the Betting Houses Act, 16 and 17 Vict., c. 119. This does not affect private betting, and betting clubs, or bets where the money is not deposited beforehand. It did not extend to Scotland; and on a revival of prosecutions under it in 1869 many betting agencies were opened in Scotland and at Boulogne. In 1874, therefore, an Act was passed extending the former Act to Scotland, and making all advertisements of betting-houses illegal. It is now strictly enforced, but does not reach "tipsters," who advise how to bet. "Welshing," *i.e.* taking money to bet with and evading payment of losses, has long been carried on by a well-known class of men on English racecourses, but was legally decided to be a felony in 1887. By the Act of 1906, and police regulations of a still later date, street gambling is punishable by heavy fines or imprisonment.

The *pari-mutuel*, the French system of betting, was started in 1886. Anyone may back a probable starter for any sum he pleases; the sum he deposits is noted and put into a purse, there being a separate purse for each starter; and at the close, all the money staked (less 10 per cent. for expenses) is divided among the backers of the winner. Recently it has been proposed to levy a tax on the gross receipts, for charitable purposes, and there are indications that this will soon be the only legal form of betting on racecourses in France. Laws against gambling are very stringent in several States of the U.S.A.

Bettws-y-Coed (pron. *Betoos-y-co-ed*, Welsh *a pleasant spot in a wood*), a village and parish, with a railway station, in the E. of Carnarvonshire, North Wales, 3½ miles from Llanrwst. It is a favourite resort of tourists and anglers, and is a convenient starting-point for ascending Snowdon from the east. Pop. (1901), 3,624

Betty, William Henry, the son of an Irish doctor, was born at Shrewsbury in 1791, and appeared on the stage at Belfast before he was twelve. He then came to London in 1803, and as "the Infant Roscius" roused extraordinary enthusiasm at Covent Garden and Drury Lane, the king even noticing him personally. In 1808, having made a good deal of money, he went to Cambridge. On his return to his profession he was received rather coldly, and in 1832 finally retired. He died in 1874.

Beust, Frederick Ferdinand, Count von, was born at Dresden in 1809, and entering the diplomatic service of the kingdom of Saxony, visited several foreign courts. In 1849 he was appointed Minister of Foreign Affairs as a decided Conservative, opposed to the revolutionary spirit then at work on the Continent. In 1853 he became Prime Minister, and somewhat relaxed his repressive policy. He stood forward as the champion of the smaller states, and morally supported Schleswig-Holstein against the encroachments of the Bund. After the war of 1866, seeing that Saxony was paralysed, he transferred his services to Austria, receiving the foreign portfolio. He now revealed himself as a strong Liberal, and being made Chancellor of the Empire, introduced many great reforms, conciliating Hungary, curbing the Ultramontanes, and putting the army on a sound footing. His sympathies were with France in the war of 1870, but he preserved strict neutrality, and on the proclamation of the North German empire held aloof from any alliance. From 1871 to 1878 he was ambassador in London. His influence waned in later years, and he died in retirement in 1886.

Beuthen, a town in Prussian Silesia, near the Polish frontier. It is the centre of an important mining district, and manufactures earthenware and woollen cloths. Nieder Beuthen, a smaller town, is

situated in the government of Breslau, on the river Oder. It was the capital of the principality of Carolatti-Beuthen.

Beveland, NORTH AND SOUTH, two islands on the coast of Holland, lying in the estuary of the Scheldt a little E. of Walcheren, and forming part of the province of Zeeland. The northern island is low and swampy; the southern is the larger and more fertile, Goes being its capital. Their united area is 120 square miles.

Beverley, a municipal borough and market town in the E. Riding of Yorkshire, 9 miles N.W. of Hull, and on the North-Eastern Railway. Until 1885 it returned two members to Parliament, but now forms part of a division of the county. The minster, or collegiate church, dedicated to St. John, is a fine specimen of mixed Gothic architecture, and contains the tombs of the Percys and some remarkable carving. St. Mary's is also a handsome Gothic structure, and the grammar school is ancient. The chief manufactures are agricultural implements, oil-cake, manures, cement, and iron castings. There is a large trade in corn, coal, and leather. The great drain known as the Beverley and Barnston Cut is in the neighbourhood. It gives the title to a suffragan bishopric. Pop. (1901), 13,185.

Beverly, a port on Ann Harbour, Massachusetts, U.S.A., connected with Salem by a bridge, and 16 miles N.E. of Boston. The fisheries are valuable, and there is a coasting trade.

Bevis of Hampton, a legendary knight, whose exploits are related by Drayton in the 2nd book of his *Polyolbion*. Southampton was the scene of his career, and Heylin asserts that he was an earl of that place. His statue adorns one of the gates, and he is generally regarded as having been of gigantic proportions.

Bewcastle, a small town in the centre of the mines of coal and lead in E. Cumberland, 10 miles N.E. of Brampton. In the churchyard is a curious obelisk.

Bewdley or BEAULIEU, a market-town and borough with a railway station, in Worcestershire, on the river Severn, 3 miles S.W. of Kidderminster. It was once a place of sanctuary, and Henry VII. built a palace there for Prince Arthur, in which his marriage took place with Catherine of Aragon. Iron and brass wares, leather, combs, and malt are the chief manufactures. Pop. (1901). 2,866.

Bewick, THOMAS, was born near Newcastle-on-Tyne in 1753, his father owning a colliery. He showed a taste for drawing, and was apprenticed to Beilby, an engraver at Newcastle. He spent a year in London, but returned to the north in 1777, and became Beilby's partner. His famous *History of Quadrupeds* appeared in 1790, and established his reputation as the ablest wood-engraver of the day, and an artist of rare observation, skill, and humour. The *History of British Birds* was published in 1797, and he also illustrated in connection with his brother, John, the works of Gay, Goldsmith, Parnell and Somerville. His last complete work, *Æsop's Fables*, came out in 1818. He was engaged in conjunction with his son upon *British Fishes* at the time of his death in 1828. His work was appreciated from the first, and has steadily grown in estimation and value since his decease.

Bey (also written BEG), a title of respect given to persons of importance in Turkey.

Beyle, MARIE HENRI, better known under his pseudonym of De Stendhal, was born at Grenoble in 1783, and educated at the École Polytechnique. After various essays in other careers he finally adopted literature as a profession. He spent much of his life in Italy, and was appointed French Consul at Civita Vecchia in 1830. His graver works include the *Lives of Haydn, Mozart, and Metastasio*, a *History of Painting in Italy, Rome, Naples, and Florence in* 1817, the *Life of Rossini*, and *Memoires d'un Touriste*. But his fame rests chiefly on his two powerful novels, *Rouge et Noir*, and *La Chartreuse de Parme*, in which his vein of irony, wit, and analytical observation is fully displayed. Balzac was influenced by his example. He was strangely averse to publicity, and wrote under many assumed names. He died suddenly in 1842.

Beypur, or BAIPUR, a port in the Madras Presidency, British India, on the N. of the estuary of the Sherapoya. It has a fair harbour accessible to vessels drawing under 14 feet, and is connected with Madras by railway. Iron ore is found in the neighbourhood.

Beyrout, or BAIRUT, a fortified port on the coast of Syria, 57 miles N.W. of Damascus, to which it serves as a commercial depôt. It is a very ancient place, the Berothah or Beryta, probably, of the Phœnicians. The walls are three miles in circumference, but the suburbs extend far beyond. The old harbour having silted up, a new one was constructed in 1873, when waterworks were also established. There are many European churches, convents, and schools, and most of the powers are represented here by consuls. The local manufactures consist of gold and silver thread, silk tissues, and cotton goods. Sponges, galls, gums, madder, silk and wool are exported, and great quantities of goods from the West pass by this channel into Asia.

Beza, or DE BÈZE, THEODORE, born at Vezelai in Burgundy, in 1519, was educated for the bar, and after a dissipated youth came under the influence of the Reformers, and went to Geneva, being subsequently appointed professor of Greek at Lausanne. Ten years later he joined Calvin as his assistant in the newly-founded church and university of Geneva. At the invitation of the King of Navarre he was present at a conference of orthodox divines, and his arguments are said to have converted the royal listener. He accompanied Condé in the war of Ligne, and was present at the battle of Dreux. In 1564 he succeeded Calvin as head of the Reformed church, and in 1571 presided over the Protestant synod at Rochelle. His activity and industry were marvellous, and he continued to look after the great interests confided to him until 1600. His death occurred in 1605. The chief of Beza's numerous works are his metrical version of the Psalms, his

translation of the New Testament, and his *History of the French Reformed Churches.*

Bezants, which are of frequent occurrence in heraldry, are plain flat circular pieces of gold. They derived their name from the ancient gold coin of Byzantium (now Constantinople), the value of which is stated to have been £375 sterling, and from their Eastern origin are popularly supposed to owe their introduction, like many other figures, to the Crusades. Similar circular figures have a separate name for each individual colour; but when of two tinctures (as is sometimes the case), or when the colour may not be known, the general term *roundle* is used (under which word each description is particularised). The term *bezantée* is used when the field or any charge is strewn promiscuously with bezants, without any number or particular position being specified.

Beziers (classic *Bætona Septimanorum*), a city in the department of Hérault, France, on the left bank of the river Orbe, 38 miles from Montpellier. The town is surrounded by a towered wall, and has a fine Gothic cathedral, St. Nazaire, parts of which date from the twelfth century. The episcopal palace is used for government offices. There are remains of a Roman amphitheatre and of a causeway over the marsh of Cap-estang. In 1209 Simon de Montfort destroyed the place whilst marching against the Albigenses, and 60,000 people perished. It suffered in the subsequent religious wars, and was dismantled in 1632. It enjoys a large trade, and manufactures gloves, silk hosiery, brandy, starch, leather, glass, etc.

Bézique, a game of cards played with two packs, from which all the cards below the seven (excluding the ace) have been taken out. The object is to "declare" certain combinations of cards (bézique, double bézique, sequences, etc.), and to secure the aces and tens. Four, three, or two persons may play the game.

Bezoar (from Persian *pād-zahr*, expelling poison), a stony concretion variously coloured, formerly in high repute throughout the world, and still highly esteemed in China as a drug, especially as an antidote to poison. It was said by some to be obtained from mines, by others from the heads of certain serpents, by others to grow in the eyes of stags which had devoured venomous snakes. The Oriental bezoar was said to come from China and Thibet, and was really a concretion formed in the stomach of some ruminant animal, generally a gazelle, from unknown causes, or else a urinary calculus. The Occidental bezoar was a similar concretion from the llama. Bezoars of various kinds were among the presents sent to Napoleon I. by the then Shah of Persia; some were analysed, but thrown away on their nature being ascertained. As medicines they are simply inert.

Bhagavat Gita (Sansc. *the song of Krishna*), a song, consisting of eighteen lectures, relating a discourse of the god Krishna to Arjuna, his pupil, during a battle. It is very highly thought of by some critics, notably Schlegel, who published an edition of it with a Latin translation in 1846.

Bhagirathi, a river in Garwhal State, North-West Provinces of India, rises from the Gangotri peak, and after joining the Alaknanda at Deoprayag, flows on as the Ganges. Though smaller than the Alaknanda, the Hindus yet regard it as the chief feeder of the latter stream.

Bhamo, a Burmese town on the left bank of the Irawaddy. It is the chief centre of the trade with China, being only 40 miles from the Chinese frontier, and is the starting-point of caravans for Yunnan.

Bhandara, the name of a district and town of British India in the central provinces. Its boundaries are—on the N., the districts of Seoni and Balaghat; on the E., Raipur; on the S., Chanda; and on the W., Nagpur. Its chief river is the Wainganga, and it contains more than 3,500 lakes. The area is 3,148 square miles, of which upwards of a third is under jungle, producing gums, fruits, honey, etc. The chief article cultivated is rice, though there are other crops of grain, oil seeds, sugar cane, cotton, vegetables, etc. Iron and stone are found, and its manufactures are chiefly hardwares and cloth. It became British property in 1854. The town of Bhandara is the chief in the district, trading principally in cotton and hardware.

Bhang, or HASHISH, a liquor or drug prepared from dried hemp leaves; it is intoxicating in its effect and is much used in India.

Bhannagar, capital of the native state in Gujerat, is a seaport town with a good and safe harbour.

Bhanpura, a town of Central India, Indore state, on the Rewa river. It is surrounded by a wall, has an unfinished stone fort and palace, and the beautiful mausoleum of Jeswunt Rao Holkar.

Bhartpur, the name of a native state and fortified town in Rajputana. The state is bounded on the N. by the district of Gurgaon, E. by the district of Muttra and Agra, S. and W. by the Rajput states. Amongst the hills which occupy chiefly the northern part of the state are found good building stone and iron ore. In the south is found the stone known as Upper Bhanner stone, of which are built the most celebrated monuments of the Mogul dynasty. It is a poorly watered country, but being well-irrigated is made to yield good crops of wheat, maize, cotton, pulses, and sugar. Salt of an inferior quality is also produced. The town is situated on the road between Agra and Ajmere, and on the Rajputana state railway. The fortifications were built by Badan Singh in 1733. An interesting manufacture of chauries is carried on, the art of making this particular kind being kept a secret.

Bhartrihari, an Indian poet of whom little is known. He is said to have been the brother of King Vikramaditya, who flourished B.C., and that after a licentious life, or in disgust at the infidelity of his favourite wife, he withdrew from the world and ended his days at Benares in devout contemplation. His *Centuries of Verse* are a mixture of the amatory, the worldly wise, and the religious, and were introduced to European readers in the 17th

century. He is also said to have written a grammatical work.

Bhatgaon, a garrisoned town of Nepaul, and formerly the favourite residence of the Brahmans of the country. It is eight miles from Khatmandu, the capital of Nepaul, and does a trade in the making of cooking utensils, etc.

Bhatti (BHAT), a widely-diffused Tibeto-Aryan race in Nepal, Rajputana, Bengal, Gujerât, Sindh, and elsewhere. They claim descent from Yadu, a legendary patriarch of the Vedic Aryans, but are certainly a mixed race, who at a remote period adopted the Hindu religion and the Sanscrit language; present speech, various modified forms of Hindi.

Bhavabhuti, Indian dramatist with the title Sre-Kanta, meaning *he in whose throat is eloquence*, was born some time in the 8th century in Beder or in Berar, and was a Brahman. He wrote the *Uttara Rana Charita*, *Maha-Vira-Charita*, and *Malati Madhava*. Professor Wilson translated some of his dramas into English.

Bheels. [BHILS.]

Bhils (Sanskrit *bhilla*, wild, rude), a widespread non-Aryan race, Central India, chiefly in the Vindhya hills, Malva, Mevar, Kandesh, Gujerât, etc., bordering east on the Gonds and intermingled here and there with the Kols, with whom they seem to be fundamentally connected; are still semi-independent in the so-called "Bheel tract," Bagar, under their own ravats (chiefs). Two main divisions: *Ujvala* ("bright," that is, "white") and *Kâla* ("black"), the latter pure, the former mixed with Aryan elements. Speech of Ujvala, a corrupt Hindi, of the Kâla, a doubtful Kolarian dialect. Numerous clans, but no castes; type medium height, straight eyes, slightly prominent cheek bones, long and lank black hair, strong active figures. The full-blood Bhils are estimated at over a million, the half-breeds at many millions. The great majority of the Minas in Bundi (Rajputâna) are of Bhil stock, and alliances between the Bhils and Rajputs date back to remote times, probably prior to the institution of the caste system. The term *Bhilâla* is still applied to numerous low caste communities in N.W. India sprung from Rajput fathers and Bhil mothers.

Bhiwani, a town in Hissar district, Punjab, and chief centre of trade in the district, which it owes to being chosen in 1817 as the site of a free market. The chief articles of trade are sugar, pepper, spices, metals, and salt.

Bhod-pa, the collective national name of all the peoples of Tibetan stock in Tibet and along the southern slopes of the Himalayas, from *bhôd* (bhôt, bhûd, bût, bhôd, etc.,) = land, and *pa* = people, in the sense of autochthones, aborigines; hence *Bhûtan*, and *Bhotiya* the name applied by the Hindus to all Tibetan peoples. The word occurs in early Sanscrit writings under the form of Bhôja, and the inhabitants of Bhojpûr are still called Bhôjas. In the Vedic poems the Bhôjas are always represented as Aryans, but only in a religious, not in an ethnical sense. Like all the pre-Aryan peoples they belonged to the Mongolo-Tibetan race originally, and in their features they still show traces of Tibetan blood.

Bhopal, name of a native state in Central India, and of a town. The state is bounded on the N. and W. by Scindhia's territory and one or two petty states of the Central India Agency, E. by the British district of Sagar, and S. by the Nerbudda and by Holkar's territory of Aimawar. Its area is 6,870 square miles. The Bhopal dynasty was founded by Dost Mohammed, and has always been friendly to the British Government. The town is surrounded by a wall two miles in circuit, and has two forts. It is supplied with water from two artificial lakes.

Bhotiya. [BHOD-PA.]

Bhuias, collective name of numerous non-Aryan or mixed low-caste peoples, North India, from Gondava and Orissa to West Assam, in Chota Nagpôr, Bengal, etc. Four main divisions: Mal or Desh, Dandsena, Khatti, Rajkal; speech, Oriya, Bengali, Hindi, according to the localities, the primitive Kolarian tongues being long extinct.

Bhuj, chief town of the state of Cutch, stands at the base of a fortified hill. In it are monuments of archæological interest, a mosque, and mausoleums of the Raos of Cutch.

Bhûmapûtra (*i.e. sons of the soil, aborigines*), the general name of the non-Aryan hill and forest tribes, North-West India. The word is of great antiquity, occurring in the early Rajput records, and particular tribes between the Ganges basin and the Deccan are still called Bhûmyas, Bhoïmiahs, Bhûmijis, Bhûmyars, words simply meaning aborigines, and unknown to the tribes themselves.

Bhunder. [MACAQUE, RHESUS.]

Bhutan, or BOOTAN, an independent kingdom in the Eastern Himalayas. It is bounded on the N. by Tibet, E. and S. by Assam, and W. by Sikkim. Its area has been variously estimated at ten, fifteen, and twenty thousand square miles. Its surface is rugged and mountainous, in the northern part reposing in the region of perpetual snow. Forests of oak and pine and other trees, and the ordinary agricultural crops, are found in its more genial districts. The rulers of the Bhutanese, who are Bhuddists, are named *Dharm Rajah*, the spiritual head, and *Deb Rajah*, the temporal head. These are controlled by a body of permanent ministers. Polygamy and polyandry prevail, and the people are in a backward and degraded state. Among the exports of the country are horses, musk, salt, and silk. Its chief towns are Poonukka and Tassisudon.

Biafra, BIGHT OF, is a large bay in the Atlantic Ocean, at the eastern part of the Gulf of Guinea, between Capes Formosa and Lopez. The delta of the Niger is between it and the Bight of Benin. It receives also the Calabar rivers, the Cameroon and the Gaboon. In it are the islands Fernando Po, Prince's, and St. Thomas's.

Bialystok, a fortified town of Russia, in the government of Grodno, formerly in the Polish province of Podlachia. It was transferred to Prussia on the partition of Poland in 1795, and by the treaty of Tilsit to Russia. Situated on a tributary of the Narew, it is well built, and has beautiful pleasure grounds connected with the castle, formerly the property of the Counts Braniski, and styled the "Versailles of Poland," but now under the municipality. It has an active grain and timber trade and manufactures in textiles, leather, soap, tallow, etc.

Biancavilla (meaning *white villa*), a Sicilian town on the southern slope of Mount Ætna, from which it is about 10 miles distant. It trades chiefly in cotton, grain, and silk.

Bianchini, FRANCESCO, astronomer, was born in 1662 at Verona. He was educated at Padua, and though he took holy orders he devoted his attention chiefly to science. In 1684 he removed to Rome, and was appointed librarian to Cardinal Ottoboni, afterwards Pope Alexander VIII. He became secretary of a committee appointed for the reform of the calendar, was engaged to draw a meridian line through Italy, and superintended the antiquities and monuments of Rome. He died at Rome in 1729, a monument being erected to his memory in Verona cathedral.

Bianconi, CHARLES, was born in 1786 at Tregolo, a village in Lombardy. Going to Ireland, he there, in 1815, after being a seller of prints, a carver and gilder, and a dealer in bullion, started a public conveyance between Cahir and Clonmel. His business as a jobber grew to such an extent that his cars covered a distance of nearly 4,000 miles per day. He was twice, in 1844 and 1845, mayor of Clonmel, and after he had purchased the estate of Longfield in the neighbourhood of Cashel he was appointed in 1863 a deputy-lieutenant. He retired in 1865, and died ten years later. His family was connected with O'Connell's by marriage.

Biarritz, a French bathing place in the department of Basses-Pyrénées on the Bay of Biscay. Its renown as a watering-place dates from the occasional residence there of Napoleon III. and the Empress Eugénie during the years 1855-70. It has some curious grottoes.

Bias, of Priene, near Miletus in Ionia, who lived about 550 B.C., was one of the traditional Seven Sages of ancient Greece. Many aphorisms are attributed to him—"Power shows the man," "Know and act," and others: but they mostly bear the stamp of a later origin, and many were probably invented to display the independence of worldly goods and cares which after Socrates' time was part of the character of the typical philosopher.

Biaxial Crystals are such as possess a certain definite optical property. A wave of light emanating from a point within the crystal, which must be transparent for such waves, will divide into two parts, as is usual with all substances exhibiting the phenomenon of double refraction (q.v.). For any given direction in the crystal, each part of the wave will have a definite wave-velocity, and as a rule the wave-velocities for the two parts will be different. In *biaxial* crystals there are two definite directions in which the wave-velocities are equal; in *uniaxial* crystals there is only one direction in which the wave-velocities for the two parts are equal. As examples of the biaxial type we have borax, sugar, felspar, and nitre. [POLARISATION OF LIGHT.]

Bib (*Gadus luscus*), a small food-fish, common on the rocky parts of the British coasts, and ranging as far north as Greenland. The upper surface is light yellowish brown, lighter below, and tinged in places with bluish-grey. There is a spot at the base of the pectoral fin as in the whiting (q.v.), to which the Bib is closely allied. Called also Pout, Blebs, and Blinds, and all its popular names have reference to its power of inflating a membrane which covers the head.

Biberach, a town of Würtemburg, in the circle of the Danube, situated at the junction of the Biberach with the Riss, a tributary of the Danube. It has an ancient church, dating from the 12th century, also a hospital and a college. It was a fine imperial city until 1802, when it came under the government of Baden, being ceded to Würtemburg in 1806.

Bible. The word Bible is derived through the ecclesiastical Latin term *biblia*, from the Greek βιβλία (*biblia*) meaning books, which it is believed was first applied to the sacred volume by John Chrysostom, patriarch of Constantinople from 398 to 404 A.D. βιβλία (*biblia*) is the plural of βιβλίον (*biblion*) = (1) paper, a letter, (2) a book. It is a diminutive of βίβλος (*biblos*) = the inner bark of the βύβλος (*bublos*) or papyrus (*Cyperus papyrus* or *Papyrus antiquorum*), of which paper was anciently made. The general adoption by the Greek-speaking Christians of Chrysostom's word βιβλία (*biblia*), books, without any qualifying adjective, as a sufficient designation for the sacred writings, implies that they concurred with him in thinking that these alone were worthy of being called books; or, at least, stood pre-eminent above all other literary productions. Whilst the Romans adopted the Greek term *Biblia*, they had also a word or words of their own, which, being more familiar, came better home to their hearts. Sometimes they said *Scripturæ*, *i.e.* writings, and sometimes *Scriptura*, *i.e.* writing. Like *Biblia* these words implied the unique or pre-eminent value of the Bible above other writings, whilst *Scriptura* added to this a new idea absent from the Greek word. *Biblia* was a plural; *Scriptura*, a singular; the latter word, therefore, recognised that under the diversity of authorship there was an essential unity, produced by the controlling influence of One Directing Mind. The rich and copious English language deriving its names for the sacred writings from both the Greek and the Latin, recognises at once the diversity and the unity pervading the sacred writings, the terms Bible and Scripture

pointing at the latter and Scriptures at the former. As, however, "Bible" is more frequently used than Scriptures, the ordinary English reader is continually in danger of forgetting the diversity and remembering only the unity. When note is taken of both, it is found that a remarkable phenomenon presents itself.

If the Mosaic authorship of the Pentateuch or of any part of it be admitted, and the approximate accuracy of the received Hebrew chronology be allowed to pass unquestioned, then the period during which the Bible was in process of production exceeded 1,500 years. The sacred writers differed greatly from each other in station, in education, and in various other respects. Yet when all their writings are brought together, they are found to be pervaded by an organic unity. If they were produced by the operation of One Directing Mind, then that mind, living and acting through fifteen consecutive centuries, cannot have been human but must have been Divine.

The Bible everywhere, directly or indirectly, claims to be a revelation from God, and it becomes at once the duty and interest of every human being to examine the evidence on which the claim is brought forward. The science instituted for the purpose is called Apologetics; but almost at the threshold of the inquiry questions arise which fall under the province not of Apologetics but of Biblical Criticism. They are these: What books are meant when the word Bible is used, and, when this point is settled, then what dependence can be placed on the text of these books, as we now have it, and if it has in any places become corrupt, are there means for bringing it nearer to its pristine purity? The Bible, as the word is understood in England, is generally held to consist of 66 books. These are naturally divided into two leading portions, the Old and the New Testaments. A third portion, the Apocrypha, intermediate between these two in date, is accepted as of Divine authority by the Church of Rome, but rejected by the Protestant churches; the term Bible is used in this article in the Protestant sense. The designation, Old Testament, is the rendering of *Vetus Testamentum* in the Latin Vulgate translation of 2 Cor. iii. 14. Testamentum in Latin means properly the solemn declaration of one's will; hence a will, a testament. The Greek Διαθήκη (Diatheke) has two meanings: (1) a will and testament, (2) a covenant. Here it seems to mean covenant, and is so translated in the Revised Version. The Old and New Testaments, therefore, had better have been rendered the Old and New Covenants.

Nearly the whole of the Old Testament is written in Hebrew, the trifling exception being that a few passages in the later books are in Aramaic. They are Ezra iv. 8 to vi. 18, vii. 12 to 26; Jer. x. 11; and from Daniel ii. middle of verse 4 to vii. 28.

The Old Testament consists of 39 books; Josephus reduced them to 22. This, however, is done arbitrarily to conform them to the number of the primitive Hebrew letters. Probably he regarded the twelve minor prophets as one book, combined Ruth with Judges, 2 with 1 Samuel, 2 with 1 Kings, 2 with 1 Chronicles, Nehemiah with Ezra, and Lamentations with Jeremiah; this would take off 17 and make the number 22.

The order of the Old Testament books with which we are familiar is not quite the same as that which exists in the Hebrew Scriptures, and some of the names have been altered from those originally given. The following is the order in the Hebrew Bible, and where the ancient (Hebrew) names have been altered, the meaning which they bore is appended within parentheses:—

1. Genesis (In [the] beginning); 2. Exodus (And these are [the] names); 3. Leviticus (And he called); 4. Numbers (In [the] wilderness); 5. Deuteronomy (These [are] the words); 6. Joshua; 7. Judges; 8. 1 Samuel (Samuel, *Aleph*, (A); 9. 2 Samuel (Samuel, *Beth*, (B); 10. 1 Kings (Kings, *Aleph*, (A); 11. 2 Kings (Kings, *Beth*, (B); 12. Isaiah; 13. Jeremiah; 14. Ezekiel; 15. Hosea; 16. Joel; 17. Amos; 18. Obadiah; 19. Jonah; 20. Micah; 21. Nahum; 22. Habakkuk; 23. Zephaniah; 24. Haggai; 25. Zechariah; 26. Malachi; 27. Psalms; 28. Proverbs; 29. Job; 30. Song of Solomon (Song of Songs); 31. Ruth; 32. Lamentations (How!); 33. Ecclesiastes (Preacher); 34. Esther; 35. Daniel; 36. Ezra; 37. Nehemiah; 38. 1 Chronicles (Daily Chronicles, *Aleph*, (A); 39. 2 Chronicles (Daily Chronicles, *Beth*, (B).

The names Genesis, Exodus, Leviticus, Numbers, Deuteronomy, and Lamentations, are either copied with or without modification, or are translated from those employed in the Greek Septuagint. The Hebrew designations of the same books are formed, as a rule, by taking the first two or three words with which each begins, and using them as a title. There are, however, two slight exceptions. In the case of Numbers, the words "In (the) wilderness," selected as a title, are not quite the first, though very nearly so; and in that of Lamentations, the initial clause, "How doth the city sit solitary," is cut down to the single word "How!" These books the Jews divided into three groups:—(1) The תּוֹרָה (Torah), or law, containing the five books of the Pentateuch. (2) The נְבִיאִים (Nebhim) or prophets, divided into the earlier prophets, Joshua, Judges, 1 and 2 Samuel, 1 and 2 Kings; the later prophets (the greater, viz. Isaiah, Jeremiah, and Ezekiel; and the lesser, viz. the twelve minor prophets). (3) The כְּתוּבִים (Kethubhim), or Sacred Books, called by the Greeks Ἁγιόγραφα (Hagiographa), including Psalms, Proverbs, Job, the Song of Songs, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra, Nehemiah, and 1 and 2 Chronicles.

In the prologue to the apocryphal book of Ecclesiasticus, 290 to 280, or 170 to 117 (?) B.C., mention is made of "the Law, the Prophets, and other books of our fathers." In the New Testament our Lord spoke of "the Law of Moses, the Prophets, and the Psalms" (Luke xxiv. 44). More generally the three divisions were reduced to two, "the Law and the Prophets" (Matthew v. 17, vii. 12, xx. 40; Acts xiii. 15; Romans iii. 21).

To the Jews were committed "the oracles of God," and they showed themselves worthy of the trust; they never attempted to falsify the Hebrew Scriptures, and when the Septuagint translation into Greek, begun, apparently at Alexandria, in the third century B.C., and the Samaritan Pentateuch of more doubtful date, but apparently about the same time, had been made and diffused abroad, any tampering with the sacred text would soon have been detected.

Except perhaps the Gospel of St. Matthew, which may possibly have had a "Hebrew" or Aramaic original, the books of the New Testament are all but universally believed to have been composed, as we now find them, in Greek. The early Church carefully inquired into the claims of the several New Testament books. At an early period it accepted as canonical twenty, comprising, according to Gaussen, 7,059 of the 7,959 verses into which the modern New Testament is divided, or about eight-ninths of the whole. They were the four Gospels, the Acts of the Apostles, the thirteen epistles of St. Paul, 1 Peter, and 1 John. Five of the remaining seven, James, 2 Peter, 2 and 3 John, and Jude, were for a time considered doubtful, but were ultimately accepted, while the remaining two, Hebrews and Revelation, were received at first with unanimity, but subsequently for a time were regarded by some churches as doubtful, after which they again met with universal acceptance.

The Greek manuscripts of the New Testament are of two kinds, Uncials and Cursives. If the word Uncial is not corrupt, it must be derived from the Latin *uncialis*, in the sense of an inch high. It is used of manuscripts in which all the letters are capitals, and which in general have no spaces between the several words. Uncial Greek writing began to decline in the sixth, and died out in the tenth century. Cursive is from the Low Latin *cursivus*, running, which again is from the classical Latin verb *curro*, to run. The letters in cursive manuscripts are not capitals, and, as a rule, there are spaces between the several words.

The leading Uncial Greek manuscripts of the New Testament, entire or somewhat incomplete, are the following five:—*a*, the Alexandrian; *b*, the Vatican; *c*, the Ephraem; *d*, Beza's and ℵ (Aleph), the Sinaitic manuscripts. Of these, *b* is not more recent than the fourth century, and is perhaps older. ℵ is also of the fourth century, *a* and *c* of the fifth, and *d* of the sixth. Adding other uncials and the cursives, about 1,760 manuscripts of the New Testament, some complete, others defective, are known. Essentially agreeing, they yet differ in minute points so that the various readings amount to 150,000. Most of them are of no importance, and the remainder are most helpful in settling the original text. Ancient versions are also of use, especially the Syriac Peshito (simple) made in the second century, and the Latin version, revised by Jerome, in the fourth century; this is now called the Vulgate.

The division of the Bible into chapters is attributed to Cardinal Hugo in the thirteenth century, and that into verses was borrowed, it is believed, from the Jewish "Masorites" of the ninth. The verses of the New Testament as they now stand are due to Robert Stephens, the printer (1548 and 1551). The Geneva Bible is the first English one with the present divisions of chapter and verse.

During the period when Anglo-Saxon was the language of England, viz. from the time of the earliest Saxon settlement in the island till about A.D. 1150, and again subsequent to that period, when Middle English had become the language of the country, translations from the Latin into the vernacular of Scripture portions, especially the Gospels, but occasionally also the Psalms, and even the Pauline epistles, were made from time to time, but no translation of the whole Bible seems to have been attempted till Wycliffe appeared. He was born about 1324, and died on December 31st, 1384. About 1382 or 1383 he published a translation of the Bible and the Apocrypha made from the Latin Vulgate. That of the New Testament seems to have been his own, but that of the Old Testament with a part of the Apocrypha appears to have emanated from a coadjutor of his, Nicholas de Hereford. The language of Wycliffe's Bible was close to the original, but somewhat unpolished. A second edition, not so literal as the first, but with more flowing language, was issued about 1388, the chief agent in its production being John Purvey. The work did much good at the time, but being written in Middle English, which prevailed till about 1500 A.D., it did not greatly affect the language of the modern English Bible. It was different with the next version. In 1525 William Tyndale published at Wittenberg a translation which he made from Greek into English of the New Testament. An improved edition appeared in 1534. In 1530 he issued a translation from the Hebrew of the Pentateuch, and next year one of Jonah, both being printed at Hamburg. In 1534 he was cruelly put to death at Vilvorde in Belgium, closing his life of piety and usefulness by a martyr death. By this time Henry VIII.'s quarrel with the Papacy had reached an advanced stage. In 1529 Cardinal Wolsey had been deposed from the chancellorship, in 1531 Henry had been declared supreme head of the Church of England, and in 1533 he had married Anna Boleyn, about whom the quarrel with the Papacy had arisen. In 1535 Miles Coverdale, on whom the mantle of Tyndale had fallen, published the first complete English Bible, Lord Thomas Cromwell lending his patronage to the work. It was not translated from the original, but made from previous versions, Tyndale's five books of Moses, an unpublished manuscript of his extending from Joshua to 2 Chronicles, his published Jonah, and his New Testament being embodied in the work. It was dedicated to Henry VIII., who allowed it to pass into circulation. The version of the Psalms which is still retained in the Prayer Book is from the translation of Coverdale's, slightly modified by the Bishops' Bible afterwards to be mentioned. To Coverdale we were indebted for some felicitous renderings in the modern English Bible. In 1537 there appeared another version of the English Bible dedicated, like Coverdale's, to the king. It was translated nominally by "Thomas Matthew," really, it is believed, by John Rogers, who afterwards became the first martyr in Queen Mary's reign. It was made up of Tyndale's and Coverdale's translations, though the former had never obtained legal sanction. It had introductions, summaries of contents, and marginal notes, notwithstanding which it obtained the royal licence to be circulated, nay, more, a proclamation was issued requiring a copy to be placed in each church. It was thus the first Authorised Version. It was a huge folio, and was often called the Great Bible.

It appeared in 1537. It is the basis of the English text, both of the A.V. and the R.V., one reason of the respect paid to it being that the translation was made not from previous versions, but from the Hebrew and Greek originals. The statements of "Matthew" were exceedingly bold, so much so that he himself modified them in a second edition issued in 1539. The same year Taverner issued his Bible, which was founded on those of Tyndale's, Coverdale's, and Matthew's, especially on that of the last-named translator, whose views, however, when adopted, were more cautiously expressed.

In 1539 a great Bible was issued with a prologue by Archbishop Cranmer. It was a huge folio, printed in excellent type, and with a fine engraving by Holbein on the title page. Three subsequent editions had the Archbishop's name, and those of two episcopal coadjutors. The work was well executed, but the expense of the great volume put it quite beyond the means of ordinary people, and a smaller and cheaper production was required. This was supplied by the publication in 1557 of the New Testament, and in 1560 of the whole Bible at Geneva, prepared by the English exiles, the veteran Coverdale among the number, who were there as refugees during the Marian persecution. The Geneva Bible was a small quarto; it discarded black letter and adopted Roman type, borrowing at the same time from the Hebrew Scriptures the convenient division into verses. It was the first Bible which omitted the Apocrypha. It had explanatory and dogmatic notes. It became extraordinarily popular, especially among the English Puritans and the Scottish Presbyterians, and during the succeeding half-century ran through eighty editions.

The Geneva Bible not in all respects pleasing some of the higher Anglican dignitaries, Archbishop Parker planned a new version, which came out in 1568 as a great folio, with engravings, and a map. There was an elaborate preface, and the division into verses was retained. Its size and expensiveness limited its circulation, and notwithstanding its publication, the cheaper Geneva Bible held its ground.

In the controversies of the Reformation the taunt was often thrown out that the Church of Rome declined to put the Bible into the hands of the people. As a reply to the charge, an English translation of the New Testament was published at Rheims in a quarto volume in 1582. In 1609 the Old Testament and Apocrypha were published at Douay, completing the work. There were explanatory and dogmatic notes.

When the seventeenth century opened, the dignitaries still held to the Bishops' Bible and the common people to that issued at Geneva, while a few Hebrew and Greek scholars were dissatisfied with both, and wished a new translation. The Puritans, having Dr. Reinolds, of Corpus Christi College, Oxford, as their spokesman, brought the subject of revision forward at the Hampton Court Conference in 1604, King James after a time supporting their views. Action being resolved upon, fifty-four eminent Hebrew or Greek scholars were invited to undertake the work, and forty-seven actually did so. They were divided into six classes, two to sit at Westminster, two at Oxford, and two at Cambridge. Each member of a class was to give his translation of all the portion of the Bible committed to that class. Then the translations were to be compared, and one more perfect than any of them taken separately to be made by selection from them all. Then other classes were to see if they could improve it, so that nothing should be published till it had received the imprimatur of the revisers as one body. They worked for four years, from 1606 to 1610. The patentee, Robert Barker, paid all expenses, and in 1611 issued from the press what ultimately became "the Authorised Version of the English Bible." A revision nominally of the Bishops' Bible, its pages were enriched by accurate or felicitous renderings from the previous versions, from that of Tyndale onwards. Though sanctioned, it was not enjoined to be read in churches, but gradually it made way, displacing at last every other rival, not excepting even the popular Geneva Bible. It owes its success to its own great merits. It has become the first English classic, and helped to fix the English language, as Luther's Bible did that of Germany. Its praise is throughout the world. But no human production is perfect, and from time to time during the nineteenth century wishes for revision began again to be expressed. In February, 1870, therefore, the Convocation of the Province of Canterbury resolved to take action in the matter. On the 3rd and 5th May principles and rules were agreed upon, one of which ran thus:—"That it is desirable that Convocation should nominate a body of its own members to undertake the work of revision, and shall be at liberty to invite the co-operation of any eminent for scholarship to whatever nation or religion they may belong." The greater part of two companies, the one for the revision of the Old and the other for that of the New Testament, was at once made up from members of the English Church, the remainder being composed of scholars belonging to the British denominations, the whole number of the revisers varying at different times from twenty-seven to twenty-four. The actual work of revision was commenced June 22nd, 1870. After a time, the co-operation of American Biblical scholars was sought and obtained. The Revised New Testament was published on May 17th, 1881. On May 15th, 1885, the first complete copy of the Revised Bible, containing now both Testaments, was presented to the Queen, the publication of the work following on the 18th. It is a great improvement on the Authorised Version, everywhere surpassing it in accuracy, though some of the new sentences are less beautiful and less musical than the old. Its publication was a conservative rather than a revolutionary act. After all changes which were required have been carried out, it is found that no doctrine has been imperilled by all this revision; the foundations of the faith stand just as they did.

Bible Society, any society which has for its specific object to circulate copies of the Bible. In the genesis and growth of Bible societies three distinct stages of evolution may be traced. In the first, commencing with the earliest Christian

century, zealous individuals lent or gave away portions of Scripture to those in whose spiritual welfare they felt special interest. The prominence given to the Bible by the Reformers of the 16th century lent an impulse to private effort of this nature, and it could now be carried on to a greater extent than in the early Christian ages, as the invention of printing in the fifteenth century had greatly reduced the price of the sacred volume. The second stage of evolution was reached when the circulation of the Bible had begun to be effected not so much by individuals as by societies, which had this for one of their objects. It commenced about the middle of the seventeenth century, when the Society for the Propagation of the Gospel in New England, incorporated in 1649 and 1661, issued in 1663 a translation of the Bible into one of the North American Indian tongues. The society which did most for Bible circulation was that for Promoting Christian Knowledge, incorporated in 1698. Among other services in this direction it issued four editions of the Bible in the Welsh tongue. The third stage of evolution was reached in 1770, when a society was formed in London for the circulation of the Bible not as one of its aims, but as its sole object. It was called the Naval and Military Bible Society. But its scope was limited, for its beneficiaries were but a small fraction of the population. When the progress of the first French Revolution, to which at first many had looked hopefully, began to be accompanied by sanguinary excesses, a feeling arose among religious men in England that a humanising and tranquilising influence would be exerted if the Gallic nation could be brought back to the Scriptures, and a French Bible Society was formed in London in 1792, but the breaking out of war between France and England in 1793 prevented it from even commencing its operations.

There was then much spiritual life in Wales, but there was a dearth of Bibles in the Welsh tongue, though the Society for Promoting Christian Knowledge had printed and sold four editions of the Welsh Bible. In 1787, and again in 1791, efforts were made to induce the Society to issue another edition. They were not, however, successful till 1799, when 10,000 Bibles, 2,000 New Testaments, with Prayer Books and metrical Psalms were printed in Welsh. The supply of Bibles was still inadequate, and the Society was afraid to incur the risk of printing more. On December 7, 1802, a few Christian friends were in conversation in London when Mr. Joseph Tarn complained that a great deficiency of Bibles still existed in Wales. He was supported by an eminent Welsh divine, the Rev. Thomas Charles of Bala, who had been much affected on finding that a Welsh girl was accustomed to walk seven miles to consult the Bible, that being the only copy to which she had access. He proposed that funds should be raised by voluntary subscription, independently of the Christian Knowledge Society, for the circulation of the Bible in Wales. The Rev. Joseph Hughes, a Baptist minister, suggested that the sphere of operations should not be simply Wales but the world, the enlarged idea meeting with universal concurrence. Mr. Hughes was requested to issue an explanation and appeal, which he did. Samuel Mills, Esq., filled in the details of a scheme for the new society, which was to have been called the Society for Promoting a more Extensive Circulation of the Scriptures both at Home and Abroad. It was inaugurated at a public meeting held at the London Tavern, Bishopsgate, on March 7th, 1804, its name being changed to the British and Foreign Bible Society. At the very outset the sectarian difficulty threatened to arise, but was wisely met and surmounted by the establishment of a rule which has worked beautifully and is still in force:—

Rule IX.—A Committee shall be appointed to conduct the business of the Society, consisting of 36 laymen, six of whom shall be foreigners, resident in London or its vicinity; half the remainder shall be members of the Church of England, and the other half members of other denominations of Christians . . .

By its second rule it was to circulate the Scriptures not only through the British dominions, but "other countries, whether Christian, Mohammedan, or Pagan"; in short, its field was to be the world. Year by year its revenues and its operations had increased in magnitude, when a second great difficulty arose. On the Continent Bibles sold better if they had the Apocrypha bound up between the Testaments. This might be understood or misunderstood to mean that the Apocrypha was considered to be a portion of the inspired Scriptures. Controversy arose on the subject, and continued for about five years—between 1821 and 1826. The Society at last yielded the point in dispute by adopting four new rules at its general meetings held in 1826 and 1827, excluding the Apocrypha from the Bibles which it circulated. From the first its growth has been continuous. Auxiliaries, branches, and associations of the Society have been formed in large numbers. Besides these, co-operating, though independent, societies have been formed in Scotland, in America, in Germany, and elsewhere. In its report for 1908 it is mentioned that there were then connected with the Bible Society in England and Wales over 5,800 auxiliaries, branches, and associations. In other parts of the world its auxiliaries, branches, and associations numbered about 2,000. Up to the 31st of March, 1808, when the first summary was made, it had circulated from London 16,544 Bibles, 63,113 New Testaments, and 1,500 portions; total 81,157. Up to March 31st, 1910, it had circulated during the preceding year 843,784 Bibles, 1,198,226 New Testaments, and 4,578,014 portions—a total of 6,620,024 copies—making altogether a grand total issued since the foundation of the Society of over 222,000,000 copies.

When the Society began there were many languages into which the Scriptures either in whole or in part had never been translated. There are fewer now, and in the last edition of the little tractate entitled *The Gospel in Many Tongues*, specimens are given of Scripture passages in 403 languages or dialects in which the Society has circulated the Bible or Scripture portions. During the first year of its existence (1804) the Society

spent on the work it had undertaken £691 10s. 2d.; during its 104th year it expended £227,456. The British and Foreign Bible Society has been like a seed of the banyan tree dropped into Indian soil; it has sent forth overarching branches, which have rooted themselves without detachment from the original stem. Seeds from it carried to other places are also growing up, and manifesting the same capacity for extension as characterised the parent tree from which they sprang.

Biblia Pauperum (*the Bible of the Poor*), a book which marks a stage in the history of printing. It was a "block book," printed early in the 15th century from wood blocks, and contained forty engravings of scenes from the life of Christ, with explanatory inscriptions, printed from letters cut on the same block as the picture. Some of the chapel windows in Lambeth Palace are copied from some of the designs, and the work has been published in facsimile.

Bibliography. The term (which means description of books) was originally applied in France to that branch of knowledge which deals with the decipherment and peculiarities of ancient MSS., now called Palæography: but is now confined to the classification and description of books. In its widest sense it will cover cataloguing and indexing —both, especially the latter, highly developed and specialised arts: but it is also applied more especially to the knowledge of books as such—taking no account of their contents except as a rough basis of classification, but dealing with their date and place of publication, typographical peculiarities, binding, differences of special editions or copies, etc. In this narrower sense it is an auxiliary to Bibliomania (q.v.).

Bibliomancy, divination by means of a book, generally the Bible, although in the *Sortes Virgilianæ* a precisely similar method was adopted with Virgil's works. The person who wished to employ bibliomancy opened the chosen book at random, and applied the first passage on which his eye fell to the particular point in which he was in need of guidance.

Bibliomania, a mania or passionate desire to possess books, generally rare or curious copies. First editions of various works have frequently been the objects of the bibliomaniac's passion, and fabulous prices have sometimes been paid for them.

Bicarbonates, salts of the acid H_2CO_3, in which only one-half of the total quantity of hydrogen is replaced by a metal. The sodium salt $NaHCO_3$ is largely used, and is prepared by action of carbon dioxide upon ordinary soda (Na_2CO_3), crystals. It is also the first product in the manufacture of soda by the ammonia process.

Bicellariidæ, a family of Bryozoa, which includes *Bugula*, "the bird's head coralline," and others of the best known of British forms of that order.

Biceps (two-headed), the name of two muscles of the body, one in the arm, the other in the leg, and which are so called from the fact that in each instance the muscle has two heads of origin. The biceps of the arm is readily felt to contract if, for example, the right upper arm be grasped in the left hand, and the right fore-arm be then flexed on the right upper arm. Of its two heads the "short-head" arises from the coracoid process of the scapula and the "long head" from the upper margin of the glenoid cavity. The muscle is inserted below into the tuberosity of the radius. The heads of the biceps of the leg arise one from the hip bone and the other from the femur, the muscle being inserted below into the fibula.

Bicêtre, a celebrated hospital on the south side of Paris, on a hill overlooking the Seine. Originally built by Louis IX. as a Carthusian monastery, it was occupied by John Bishop of Winchester in 1290 (the name is a corruption of that of his see), destroyed in 1632 and rebuilt by Louis XIV. as a hospital for old soldiers. It is now used as a lunatic asylum for bad cases.

Bichat, Marie François Xavier, physiologist, was born in 1771 at Thoirette, in the department of Ain, France. He removed in 1793 to Paris, where he became one of Desault's most brilliant pupils, and subsequently Desault's adopted son. At the same time he began to lecture, and in 1800 received the appointment of physician to the Hôtel-Dieu, the year in which appeared his *Recherches Physiologiques sur la Vie et la Mort*, followed in the following year by his still more profound *Anatomie Générale*. Bichat's death, which occurred in 1802, when he was scarcely 31 years of age, was due to overwork. During his illness he was attended by Desault's widow, whom he had never left; and after his funeral his bust with Desault's was placed in the Hôtel-Dieu by order of Napoleon.

Bickerstaffe, Isaac, dramatist, was born about 1735 in Ireland. He was a page at the viceregal court of Dublin during Lord Chesterfield's lieutenancy, 1746, then an officer in the marines, from which position he was expelled in disgrace. When he died is not known. Among his friends were Garrick and Boswell. His pieces include *The Maid of the Mill*, *The Captive*, *Love in a Village*, *The Hypocrite*, etc. Steele and Swift both used the title as a *nom de plume*.

Bickersteth, Edward, was born in 1786 at Kirkby Lonsdale, Westmoreland. While practising as a solicitor at Norwich he was ordained in 1815 as a deacon in the Church. The following year he went to Africa for the Church Missionary Society, and until 1830, when he was appointed rector of Watton, Hertfordshire, he was the society's secretary. He was also one of the founders of the Evangelical Alliance. His best-known works are *The Scripture Help*, *The Christian Student*, and *The Lord's Supper*, *The Restoration of the Jews*, etc. He was also the editor of the *Christian Family Library*. He died in 1850.

Bickerton. (1) Sir Richard, Bart., a British naval officer, after having received his education at Westminster school, obtained a lieutenant's commission in 1746, and became a post-captain in 1759

In 1773 he was knighted, and in 1778 was made a baronet. In April of the latter year, being then in command of the *Terrible*, 74, he fell in, in company with the *Ramillies*, with a French convoy of 30 sail, of which 8 were taken; and on July 27th following he was present at Keppel's unsatisfactory action off Ushant with the Comte d'Orvilliers. On this occasion his ship lost 9 killed and 21 wounded. In 1781, as captain of the *Fortitude*, 74, he assisted in Vice-Admiral Darby's relief of Gibraltar, and before the end of the year hoisted his broad pennant as commodore in the *Gibraltar*, 80. He sailed in 1782 with a convoy for India, and there joined Sir Edward Hughes, with whom he shared such credit as resulted from the action with the Bailli de Suffren, on June 20th, 1783. In this engagement his ship lost 6 killed and 40 wounded. In 1786 he was commodore in the *Jupiter*, 50, on the Leeward station, and in 1787 he became a rear-admiral. On February 28th, 1792, being then vice-admiral and commander-in-chief at Plymouth, he died of apoplexy. (2) His eldest son, SIR RICHARD HUSSEY, a very distinguished naval commander, was born in 1759, and entered the service in 1771. In 1777 he was made lieutenant, and was first-lieutenant of the *Jupiter*, 50, when, in 1778, she most gallantly engaged the French line of battle-ship *Triton*. For this service Mr. Bickerton was promoted to be commander, and appointed to the sloop *Swallow*, in which he assisted in the capture of the large American privateer *Black Prince*. In 1781, Captain Bickerton, still in the *Swallow*, was present at the capture of St. Eustatius, and in the same year, having in the meantime been posted, he took part, in the *Invincible*, 74, in Hood's action off Martinique, on April 29th. His ship lost 2 killed and 4 wounded. In 1792 Captain Bickerton succeeded to his father's baronetcy, and from 1793 to 1799 served continuously at sea. He was then promoted to be rear-admiral. In 1800, with his flag in the *Swiftsure*, 74, he served under Lord Keith in the Mediterranean, and was detached for the blockade of Cadiz. In the next year he accompanied Lord Keith on the expedition against Alexandria, in which he behaved in the most meritorious manner, having his flag for the greater portion of the time in the *Kent*, 74. In 1804 he returned to the Mediterranean as second in command, with his flag in the *Royal Sovereign*, 100, but, after assisting in the blockade of Toulon, was obliged to invalid in 1805. In that year he became a vice-admiral, and in 1810 an admiral; and from 1807 to 1812 he was a lord of the Admiralty. In the latter year he was appointed port admiral at Portsmouth, in 1815 a K.C.B., and in 1818 a lieutenant-general of marines. He died in 1832 at Bath.

Bicol, a large nation in Luzon, Philippine Islands, occupying most of the south-eastern peninsular, besides the neighbouring islands, Catanduanes and Burias; total population 800,000; speech intermediate between the Tagal of Manilla and the Bisayan of the smaller islands between Luzon and Mindanao, spoken in its purest form in the province of South Camarines. The Bicols are semi-civilised agriculturists, mostly nominal Roman Catholics.

Bicycle. [CYCLING].

Bida, a large inland town of Africa, capital of the kingdom of Nyffé, lies 16 miles N. of the Niger in lat. 9° 5′ N. and long. 6° 5′ E.

Bidar, a town in the Nizam's dominions, situated near the right bank of the Manjera, about 70 miles N.W. of Hyderabad. At one time the town was of considerable importance; it is now chiefly remarkable for its manufactures in a compound metal known as Biddery ware.

Bidassoa, a river, the source of which is in the Pyrenees. After a course of about 33 miles it falls into the Bay of Biscay, between Andaye and Fuenterrabia. It marks the boundary between France and Spain.

Biddeford, a city of the United States in Maine, on the Saco river, which, falling 42 feet here, provides excellent water power, driving many mills on each side. It has extensive manufactures in cotton and woollen goods, hardware, and iron.

Bidding Prayer (from *bid*, summon; *see* BEADLE), a prayer, or more strictly an invitation to prayer, on certain specified subjects—for the welfare of the King and royal family, the Parliament, the magistrates, the universities, etc—and also to thanksgiving for various temporal and spiritual blessings. There are several forms, one of which is ordered by the 55th Canon of the Anglican Church. It is used before university sermons (which usually are not preceded by a service), and occasionally in cathedrals and chapels royal. It is followed by the Lord's Prayer, in which the congregation joins. The "bidding of beads" (or prayers) was an early custom in the Church. The priest invited the prayers of the congregation on special subjects, which were said in silence. [BEADS.]

Biddle, JOHN, theologian, and called the father of English Unitarianism, was born in 1615 at Wotton-under-Edge, Gloucestershire. After graduating at Oxford he was in 1641 appointed master of the free school in Gloucester city. From this position he was dismissed in 1645 and arrested on account of the views put forward in his *Twelve Arguments drawn out of Scripture, wherein the commonly received opinion touching the Deity of the Holy Spirit is clearly and fully refuted*, which was ordered to be burned by the common hangman. After five years of imprisonment, during which the Westminster Assembly of Divines sought to compass his death, he was released by Cromwell, and allowed to reside in Staffordshire under surveillance. In 1652 the general Act of Oblivion restored him to complete liberty, and his followers, who were called Bidellians first, then Socinians, and finally Unitarians, began to meet regularly. In a year or two a storm of fury again broke over Biddle's head by reason of further publications, and after a period of imprisonment Cromwell, to save his life, banished him to St. Mary's castle in the Scilly Islands, and gave him a grant of 100 crowns annually. In three years he was allowed to return by Cromwell, until whose death he preached in

London. After the Restoration he was again thrown into prison in July, 1662, where he died in September of the same year.

Bideford, a seaport town in Devonshire, England, on the river Torridge. A bridge of twenty-four arches and dating from the fourteenth century crosses the river here. Among its institutions are the grammar school, union workhouse, and hospital for the aged poor. Its manufactures include earthenware, ropes, sails, and leather. It figures in Kingsley's *Westward Ho!* Pop. (1901), 8,754.

Bidpai, or PILPAI, supposed to be the author of a collection of Hindu fables, which have been widely known for many centuries, and which have been translated into more languages than any other writings except the Scriptures. The original source of the fables is the *Pantchatantra* or *Five Sections*, an old Indian collection in Sanscrit. The materials of the *Pantchatantra* were worked up in the *Hitopadesa* (also in Sanscrit) or Book of Salutary Instruction, and became more widely known in Europe than the original. Of the translations may be mentioned those into Pehlvi in the sixth century, and another from the Pehlvi translation into Arabic, which became the medium of conveying these fables into Europe, and in which the author is first called Bidpai. The first English translation appeared in 1570.

Bielefeld, a town of Prussia in Westphalia. It is touched by the Minden and Cologne Railway, and is the centre of the Westphalian linen trade, having extensive bleaching fields and manufactures of woollens, thread, leather, iron, meerschaum pipes, etc.

Bielitz, a town of Austrian Silesia, on the Biala river. It is a railway terminus, and has a castle and hospital. It has manufactures in woollens, linens, and dyeworks.

Biella, an Italian town in the province of Novara. It is the see of a bishop, and manufactures hats, paper, and woollens.

Bielopol, a town of Russia, in the government of Kharkov. Its chief manufacture is brandy.

Bienne, a Swiss town in the canton of Bern, situated at N. end of Bienne Lake, and at the foot of the Jura. It was joined to Bern in 1815, having previously belonged to France. It manufactures watches, wire, leather, and cotton. BIENNE LAKE, 1,420 ft. above sea level, is interesting chiefly from its island St. Pierre, where Rousseau resided in 1765. On its shore also are prehistoric lake-dwellings.

Biennials, plants that complete their life-cycle in two years or seasons, as in the case of the turnip. They commonly only produce root, stem, and leaf structures during the first season, though often storing up nutriment in fleshy enlargements of such structures. In the second season they produce flowers and fruit ("run to seed") at the expense of such food stores, and die in completing this physiologically exhausting process.

Bifilar Suspension, an arrangement adopted in many electrical and other instruments for the horizontal suspension of needles by means of two parallel fibres. A needle thus hung, with the fibres fixed to it symmetrically, is subject to a definite *controlling force*. For if by electro-magnetic or other action a deflecting force causes the needle to turn out of its position of rest, it will be slightly raised, an action which is opposed by the weight of the needle. The closer the two fibres the less will be the lift of the needle for a given deflection; hence the smaller the controlling force. [GALVANOMETER.]

Bigamy, the contracting of a second marriage by either husband or wife during the life of either of them (there having been no divorce pronounced of the previous marriage). The offence is a felony, and is punishable with penal servitude for not more than seven nor fewer than three years, or with imprisonment with or without hard labour for any period not exceeding two years.

This offence consists in going through the form of a second marriage while the first exists, for the former can only be a marriage in form, since a man by the English law cannot have two wives nor a woman two husbands at the same time. The principal ground for criminally punishing a person contracting a second marriage is the wrong done to the deceived and injured party.

Exceptions to the above—

1. A second marriage contracted out of England or Ireland by any other than a subject of His Majesty.
2. If either husband or wife has been absent continuously for seven years and has not been known by the other to be living during that time, he or she is at liberty to marry again, and bigamy will not be committed, even though the fact prove otherwise.
3. In case of divorce from first marriage (as already referred to).
4. Where a former marriage has been declared void by a court of competent jurisdiction.

The Scottish law presents some points of difference to the above, but they are not of great importance. In the United States bigamy is criminal, and punishable by fine and imprisonment; a discretionary power as to the extent of punishment being possessed by the several States.

Bigorre, an old district of south-western France in the province of Gascony. It now forms part of the Hautes Pyrénées.

Big Sandy River in Wyoming, United States. It is a tributary of the Ohio, and is navigable. It is nearly 100 miles in length.

Bihé, a South African district under the Portuguese. Through it runs the only caravan route south of the Congo. The capital is Kaynomba.

Bijapur, or BIJAYANAGUR, meaning "city of triumph," is a city of Southern India in the Presidency of Bombay. It was founded in 1336, and was the capital of an extensive kingdom; now it is deserted, and remarkable for its ruins of temples mosques, and other indications of former greatness.

Bijawar, a native state of Hindustan in Bundelcund, covering an area of 900 square miles. Diamonds are found in it. The capital bears the same name.

Bijnaur, a district and town in the North-Western Provinces of British India, covering an area of nearly 2,000 square miles. The town, which lies 3 miles E. of the sacred Ganges, has manufactures in thread and cottons.

Bikaner, a native state of Rajputana and capital of the same. The state covers an area of more than 22,000 square miles, and though it is a somewhat bare region, without a permanently running stream, yet its cattle and horses are celebrated. From the wool of their sheep the inhabitants make every article of native dress and good blankets. The town is surrounded by a lofty wall 6 ft. thick and 3½ miles in circuit. Its industries embrace pottery, carving in stone, and the weaving of native wool into blankets.

Bilander, a two-masted vessel, usually of small tonnage and used on the canals in Holland and elsewhere, having a mainsail bent along the whole length of a yard which hangs fore and aft, and which is inclined to the horizon at an angle of about 45°. The fore-end of this yard slopes downwards and comes as far forward as the middle of the ship, where the tack of the sail is secured to a ring bolt in the deck. The rest of the rig is that of a brigantine.

Bilbao, one of the chief cities in Spain, and capital of the Basque province of Biscay or Bilbao, is situated on the Nervion, which is navigable up to the city, where it is crossed by four bridges. It is a commercial city, and in regular steam communication with London and Liverpool. It has shipbuilding yards and manufactures in iron, pottery, glass, paper, cotton, etc. For its steel it was famous in Elizabeth's time, when a rapier was called a "bilbo." It was founded in 1300 by Don Pedro Lopez de Haro, and suffered severely in the wars with France, who held it from 1808 to 1813. It withstood an attack in 1835 from Zumalacarreguy, and again in 1874 from the forces of Don Carlos. It has a cathedral and several convents, but its public buildings are of little note.

Bilberry or WHORTLEBERRY, the berry of *Vaccinium Myrtillus*, or the plant itself. This is a little erect branched shrub, related to the heaths, which is common in our woods. Its bright green leaves turn red in autumn before falling; and its small flowers have a pinkish globular corolla and anthers with appendages and with their lobes produced into tubes. The globular bluish-black berry, which has a bloom like that on a plum, is edible.

Bilderdijk, WILLEM. poet, was born in 1756 at Amsterdam. He studied law at Leyden, and while there, as well as when pursuing his calling as an advocate at the Hague, cultivated literature and the Muses. He left his country on its invasion by the French, and amongst other places visited London, supporting himself by lecturing. In 1806, when he went back to the Netherlands, Louis Buonaparte, who was now king, appointed him president of the new institute at Amsterdam, and he was otherwise well treated. Many of his publications are translations or imitations; of his original pieces the best known are *Rural Life* and *The Love of Fatherland*. Besides some war songs he also wrote a geological treatise and a *History of the Netherlands*. He died in 1831 at Haarlem.

Bile, the secretion formed by the liver, and discharged into the duodenum through the common bile duct. Human bile is a yellow viscid fluid, bitter in taste, possessing no appreciable odour, of specific gravity 1020 to 1025 (distilled water being 1000). It accumulates during the intervals of digestion in the gall bladder, from which, as the stomach passes on its contents into the duodenum, it is gradually discharged. Its composition is as follows:—

In 1,000 parts of bile there are—

Of water	about	859 parts.
Bile salts	,,	91 ,,
Fat	,,	9 ,,
Cholesterin	,,	3 ,,
Mucus and pigment	,,	30 ,,
Mineral salts	,,	8 ,,

The *Bile salts* are the glycocholate and taurocholate of sodium. Their main function is the promotion of the absorption of fatty substances from the intestinal tract. The test for the presence of bile salts is known as Pettenkofer's (q.v.).

Cholesterin possesses a theoretical interest as being the only alcohol found in the body; its practical importance arises from the fact that it sometimes forms the concretions known as gall stones.

The yellow colour of bile is chiefly due to the pigment Bilirubin. In the green bile of the herbivora an oxydised form of Bilirubin called Biliverdin is present. The bile pigment is intimately related to Hæmoglobin, the pigment of the blood. The retention of bile pigment causes jaundice (q.v.). The test for bile pigment is known as Gmelin's (q.v.). The functions of the bile are: (i) As an excrementitious substance, it separates excess of carbon and hydrogen from the blood. (ii) To promote the absorption of the fatty elements of the food. (iii) It is a natural purgative, and to its action in hastening the progress of the contents of the alimentary canal is probably to be attributed the antiseptic action bile is said to possess, inasmuch as the prolonged stay in the intestines of material in process of digestion would favour putrefaction.

Bilharzia hæmatobia, a parasitic worm belonging to the Trematoda, and nearly related to the liver fluke. Its presence in the human body gives rise to urinary troubles, particularly to hæmaturia, or the presence of blood in the urine, the favoured habitat of the Bilharzia being the small veins of the bladder, ureter, and pelvis of the kidney. The adult worm is about ½ inch in length, the sexes are distinct. The recognition of the ova in the urine is the means of demonstrating the presence of the parasite. The disease is practically

unknown in this country, but is common in Egypt and at the Cape of Good Hope.

Biliary Calculi. [CALCULUS.]

Bilin, Bile-salts. [BILE.]

Biliousness, a popular term of which it is impossible to give the equivalent in precise language. Most disorders of digestion are explained by some people as resulting from "biliousness," from the "liver being out of order," from "congestion of the liver," and the like. The looseness of such phrascology will become apparent to anyone who acquires the most superficial acquaintance with the physiology and pathology of the unfortunate organ which is subjected to so much unmerited abuse. The most favoured application of the term "biliousness" appears to be to the headache, nausea, furred tongue, lack of appetite, and constipation, with which people are apt to wake in the morning after an over-indulgence in the good things of the table on the night before. A blue pill is a favourite remedy for this state of things; but to persuade the patient to adopt preventive measures is of much more importance than to ply him with curative ones.

Bill, the horny covering of the jaws of birds, often used to include the bones enclosed in and supporting this horny sheath. These bones consist of an upper and a lower half, technically called the superior and the inferior mandible respectively. The former is made up almost entirely of the intermaxillary bones (which are greatly elongated) with the superior maxilla on each side. The latter is at first composed of twelve pieces, six on each side;

BILL, SHOWING BONES AND HORNY SHEATH.

but in the adult bird these unite, and form a single bone, more or less resembling the letter V laid on its side (<). The bill varies greatly in form and hardness in the different orders of birds, and even in the birds of the same orders. These peculiarities will be described in treating of the groups in which they occur. The primary function of the bill is to take food, but it is also used as a weapon of offence and defence, to carry and arrange the materials for the nest, to dress the feathers, to feed the young brood, as a prehensile organ, and sometimes as an organ of touch. In this latter case (as in the ducks, snipes, etc.), the texture is moderately soft, and filaments of the fifth nerve ramify through it. At the base of the bill in some birds there is a fleshy scale called the "cere," which probably also serves as a tactile organ. The nostrils are placed at the base of the bill in most birds, but they may occur in almost any part of the upper mandible; in the apteryx they are at the extremity, and in the petrels they are tubular, and situated above and not in the bill. All living birds are toothless, but in some forms the bill is notched [BIRDS OF PREY], and in others the margins of the bill are finely serrated as in some Divers. But the earliest forms known possessed true teeth [ARCHÆOPTERYX, ODONTORNITHES], and traces of teeth (dental papillæ) have been found in the young of certain parrots.

Bill has numerous meanings in legal proceedings and otherwise, as:

1. *Bill of Adventure*, a signed declaration by a merchant that goods shipped in his name are the property of another person, for whom the goods are to be sold and whose "adventure" or speculation the business is.

2. *Bill of Complaint* was a statement in writing declaring a wrong the complainant has suffered from the defendant, or some fault which he has committed against the statute law. Bills of this kind were addressed to the Lord Chancellor or others having cognisance of the matter. They are now abolished (*but in name only*), all actions in the supreme Court being commenced by writ of summons followed in most cases by statement of claim.

3. *Bill of Costs.* The statement of details of a solicitor's charges against his client. [COSTS, BILL OF.]

4. *Bill of Exceptions* to the ruling of a judge in his direction to the jury on a trial—either for mistake of law or fact.

5. *Bill of Exchange*, a common engagement for money given by one man to another. [EXCHANGE, BILL OF.]

6. *Bill of Health*, a certificate signed by a consul or other authority, and delivered to masters of ships clearing for foreign ports, as to the state of health of the port from which the ship starts. When no infectious disorder is known to prevail, the bill is said to be "clean"; when its presence is suspected but not ascertained, the bill is "suspected" or "touched"; when it is known to be prevalent the bill is "foul."

7. *Bill of Mortality*, a return of the deaths within a certain district in a given time, specifying the diseases and age at death. On such returns, especially the "Northampton tables," much of the actuarial calculations as to life insurance were originally based. The London "bills of mortality" begun in 1592, were continued till 1840, when they were superseded by the Registration Act. An allusion to them is preserved in the phrase "within the bills of mortality," an area which in the absence of municipal unity was taken as marking the extent of London.

8. *Bill in Parliament.* A draft of a new statute brought into either House of Parliament for adoption is termed "a Bill." [PARLIAMENTARY BILL.]

9. *Bill of Particulars* is a statement of details of plaintiff's demand in writing, its object being to furnish the defendant with a specific account of the plaintiff's claim against him.

10. *Bill of Peace* was brought for the purpose of establishing and perpetuating a right claimed by the plaintiff, of a nature to be controverted by different persons at different times and by different

actions (the design being to secure repose from perpetual litigation). The practice in this respect is now regulated by the Judicature Acts.

11. *Bill of Rights.* The Act 1 William & Mary, st at. 2, c. 2, is so termed because it declares the true rights of British subjects. [RIGHTS, BILL OF.]

12. *Bill of Sale* is a document given by one person to another assigning personal chattels or property by way of mortgage or absolutely. [SALE, BILL OF.]

13. *Bill of Sight* is given by Custom House authorities where the exact quantity or quality of imported goods is not known at the time. It must be perfected in three days.

14. *Bill of Victualling*, a list of necessary ships' stores subject to duty and therefore shipped out of bond. Its object is to prevent smuggling, and it is made out by the master and countersigned by the Collector of Customs. Stores not on it are liable to destruction, under the Merchant Shipping Act of 1883.

15. *True Bill.* In criminal matters when a grand jury have decided upon any presentment or indictment they write on it the words "*billa vera*," *i.e.* a "true bill."

Billaud-Varenne, JACQUES NICOLAS, revolutionist, was born in 1756 at Rochelle. He took a leading part in the murders and massacres that ensued on the destruction of the Bastille, and was notorious for his violent attitude to the royal family. He was president of the Convention in 1793, and a member of the Committee of Public Safety. In 1795 he was banished to Cayenne, and in 1819 he died in Hayti.

Bill-brokers, persons who sell and buy *bills of exchange* (q.v.) and promissory notes. The business involves special knowledge of the rates of exchange, the state of the money market, and the prospects of various trades, as well as of the personal credit of the traders. Bill-brokers commonly confine their attention to the bills of some special trade, and very frequently also act as discount brokers, *i.e.* cash the bills offered to them, and hold them till maturity, deducting of course a commission for risk as well as the ordinary rate of discount. Here their special knowledge of personal credit enables them to compete with the banks. As some of the bills offered are accommodation bills (q.v.), both classes really at times serve as money-lenders.

Bill Chamber, the term applied to that department of the Court of Session in Scotland in which a judge presides at all times during session and vacation. The youngest judge is Lord Ordinary on the bills during session; the duty is performed by all the judges in rotation (except the two presidents) during vacation. All proceedings for summary remedies or in resistance to threatened process are initiated in the "Bill Chamber," such as prohibitions or injunctions against inferior courts, suspension of writs of execution, etc. Sequestration (which is analogous to bankruptcy in England) proceedings also originate in this department. Most of the proceedings therein are matters of form, requiring only the judge's sanction, who is advised by the clerks on perusal of the papers presented if in proper form. On a question of law arising, the same is remitted to the Court of Session, and the arguments brought forward and decided upon, as in an ordinary action. The Lord Ordinary on the bills represents the court during vacation time. A large portion of his duties is regulated by the statute 1 & 2 Vict. c. 86.

Billet, an ornament belonging to Norman architecture, resembling a row or pile of billets or logs of wood turned endwise to the spectator. It is formed by cutting portions out of a moulding, or several rows of mouldings.

Billeting, a method of providing food and lodging for soldiers by quartering them on the inhabitants of a town, practised on the Continent during the annual military manœuvres, and (under careful restrictions) occasionally in England. It has always been specially offensive to English sentiment, and is attacked in one of the clauses of the Petition of Right (1628), and was prohibited by statute (if without the consent of the persons on whom the troops were billeted) in 1681. This prohibition, however, was a dead letter, and in 1689 the MUTINY ACT (q.v.) transferred the control of the practice to the municipal authorities. The liability is now limited by the Army Act of 1881 to licensed victuallers and (for horses) to livery-stable keepers. Prices to be paid for food, forage, and accommodation are fixed for each year by the Army Annual Act, and the quartermaster of the regiment makes the payment. The practice of billeting, however, is little resorted to since the development of railway communication.

Billiards. The origin of billiards is uncertain. At any rate nothing is known about it till nearly the middle of the 16th century. By some it is thought that it is derived from the French *bille*, a ball. French authors have credited the game to the English, while most English writers consider the game of French origin. The first mention of anything definite about it is in a work entitled *The Complete Gamester*, by Charles Cotton (1674), who in one part of his account speaks of it as of Italian origin, and in another part as of Spanish origin. Cotton states that the form of a billiard table is oblong, and he gives a sketch of two persons knocking about apparently round balls on a table with a raised edge to prevent the balls from rolling off, and having six pockets. There can be no doubt that the game originally was played with pockets, even in France. In the present day throughout the continent of Europe, and indeed throughout the greater part of America, the game is played on a table varying from 10 feet long by 5 feet in width, to about 8 feet by 4 feet, having no pockets at all. This is generally called French billiards. It is played with three balls, one red and two white, larger than those used in English billiards. Each player has one white ball. They play alternately, the endeavour being for the player to cause his own ball to strike each of the other balls. This is called a cannon and counts one. After making a cannon the player continues till he fails to score.

English billiards is played on a table 12 feet by 6 feet, with six pockets, one at each corner of the

table, and one in the middle of each 12-foot side. It is played with three balls, one red and two white. Each player takes one white ball. These are distinguished from each other by one having on it a small black spot; this ball is called the "spot white." The diameter of the balls in English billiards is $2\frac{1}{16}$ inch. The bed of a billiard table is of slate, with cushions all round of india-rubber; both are covered with fine green cloth. The pockets are little net bags. Each pocket should measure about $3\frac{5}{8}$ inches across at the fall.

"The spot" is situated $12\frac{3}{4}$ inches from the centre of the face of the top cushion opposite to the baulk. At the commencement of each game the red ball is placed on the spot, and replaced there each time it runs into a pocket or gets knocked off the table. The "pyramid" or "centre spot" (where the red or opponent's white is placed under certain circumstances) is at the centre of the top half of the table.

The baulk is the space behind a line drawn across the table 29 inches from the face of the bottom cushion and parallel to it. At the commencement of each game, or after a player's ball has gone into a pocket, each player has to place his ball in baulk in what is called the half circle, which has a diameter of 23 inches, the centre of which coincides with the centre of the baulk line.

The players play alternately, and each one continues to play on till he fails to score. Scores are made by means of winning and losing hazards and cannons. A winning hazard is when the player's ball causes another ball to run into a pocket. A losing hazard is when the player's own ball runs into a pocket after first striking another ball. A cannon is when the player's ball strikes each of the other balls. A cannon scores 2, a red winning or losing hazard 3, and a white winning or losing hazard 2. The "spot stroke" is a series of red winning hazards in the two top pockets, and the "all round" game means the ordinary game when only two consecutive red winning hazards off the spot are allowed as distinguished from the "all in," which includes any number of spot strokes. By far the largest "breaks" (or series of scores) have been made by these consecutive red winning hazards.

The cue is the stick used for the purpose of striking the balls. It is about 4 ft. 8 in. in length, and has one end thicker than the other. The small end of the cue is covered with a piece of leather called the tip.

The great art of playing billiards well is: When you make a score, try also to leave the balls in a position where there is an easy score to make next time. Pyramids is played with 16 balls, 15 red and 1 white, and consists of winning hazards only. POOL (q.v.) is played by any number of persons up to 12 or 13, each of whom has a ball of a different colour.

Billings, JOSH, the nom-de-plume of H. M. Shaw, a humorous writer, was born in 1818. He was a land speculator in New York state, and died 1885.

Billings, ROBERT WILLIAM, architect, was born in 1813 in London. After an apprenticeship of seven years with John Britton, the well-known topographical draughtsman, he illustrated for George Godwin a history of St. Paul's Cathedral in 1837, and in 1839 *The Churches of London*. Meanwhile in 1838 he had produced on his own account *Illustrations of the Temple Church, London*, which was followed by other more ambitious efforts, the greatest of which was *Baronial and Ecclesiastical Antiquities of Scotland*, 4 vols., 1845–52. Besides his numerous publications Billings was also employed as a restorer—in this capacity doing the chapel of Edinburgh Castle, the Douglas room in Stirling Castle, etc. He died in 1874 at Putney in the Moulinère, a house once occupied by Sarah, Duchess of Marlborough.

Billingsgate, the chief market for fish in London, is situated between London Bridge and the Custom House, on the north bank of the Thames. By the Act of 1699 it was made a "free market for fish," and until 1846 it was merely a collection of sheds. In 1874 the present stone building was finished. The name Billingsgate is also given to coarse and low language.

Billington, ELIZABETH, singer, was born about 1768, in Soho, London. Her father's name was Weichsel, a native of Freiberg, Saxony, and himself a musician. Her mother, too, was a singer of some distinction. Elizabeth was trained by her father, and made her first appearance on the stage at Dublin. Meanwhile she had been secretly married to James Billington, a double-bass in the Drury Lane orchestra. In 1786, after a twelve nights' engagement at Covent Garden, she was engaged from the end of February for the season at £1,000. After this she made a continental tour, singing with marked success at Naples, Florence, Leghorn, Venice, and Milan, where she was received by the Empress Josephine. In 1799 she married again, a Frenchman, Felissent, whose ill usage compelled her to leave him. She returned to London in 1801, in which year she is said to have made as much as between £10,000 and £15,000. In 1811 she retired, living in magnificent style at Fulham until 1818, when Felissent induced her to accompany him to the Continent. In that year she died near Venice, at the hands, it was suspected, of her base husband. In the opinion of many she was the greatest singer England ever produced.

Billion, one million millions, represented in figures thus 1,000,000,000,000. It is often, especially in America, confused with the French *billion*, which is only one thousand millions.

Billiton, or BLITONG, an island in the E. Indies belonging to the Dutch, lies between Sumatra and Borneo, and has an area of about 20,000 square miles. From 1812 to 1824 it belonged to England, who ceded it to Holland. Among its products are tortoises, edible birds'-nests, rice, iron, tin, pepper, and timber.

Bilney, THOMAS, martyr, was born about the end of the fifteenth century, in Norfolk. He studied at Trinity Hall, Cambridge, and was ordained priest by Bishop West at Ely in 1519. After some heart-searchings and spiritual struggles, he became converted to the Reformed doctrines, and in 1526

was brought before Wolsey on a charge of heresy. On taking an oath that he would refrain from promulgating the doctrines of Luther, he was dismissed, but in the following year he was again arraigned and flung into the Tower for a year. After a period of despondency brought on by reflecting on his vacillation he again began to preach, was again apprehended, and condemned to be burned as a heretic at Norwich. The martyrdom took place in the Lollards' pit on August 19th, 1531.

Bilocation, a word adopted into English from the Ecclesiastical Lat. *bilocatio*=the power or state of being in two places at the same time. This power is said to have been possessed by many of the Roman saints, notably by St. Francis Xavier and St. Alfonso di Liguori; and in the case of the latter it is attributed to him in the office for his feast (August 2). On the subject of phenomena of this class, Tylor remarks that the reception and explanation of them fit perfectly with the primitive animistic theory of apparitions. [ASTRAL BODY.]

Bilston, formerly BILSRETON, a market town in S. Staffordshire, England, and united to the Parliamentary borough of Wolverhampton, from which it is only 2½ miles distant. It is the centre of the English hardware trade. Pop. (1901), 24,034.

Bimana, an order of Mammals created by Cuvier for Man, but now only retained by the few zoologists who refuse to recognise the teachings of Evolution (q.v.). Johann Friedrich Blumenbach (1752-1840) appears to have first used the term in his treatise *On the Natural Variety of Mankind*, and as the authority of the Göttingen anatomist is so often invoked to defend the division of the Linnæan Primates (q.v.) into Bimana and Quadrumana, the passage is here given :—" From what has been so far said about the erect stature of man follows the highest prerogative of his external conformation, namely, *the freest use of two most perfect hands*. . . . For in the anthropomorphous apes themselves, the principal feature of the hands, I mean the thumb, is short in proportion, and almost nailless, and, to use the expression of the famous Eustachius, quite ridiculous ; so that it is true that no other hand, except the human hand, deserves the appellation of the organ of organs with which the Stagirite glorifies it." [FOOT, HAND, QUADRUMANA.] The reader should also consult Huxley's *Man's Place in Nature*, and Mivart's *Man and Apes*.

Bimetallism, the name given to a system of coinage under which both gold and silver are legal tender, the value relatively to one another being fixed at a certain ratio, that proposed being usually 1 to 15½. At present, though both are used in the coinage of the more advanced countries, yet the basis of the currency is usually gold only, silver being used as token money, with a conventional value. Thus 100 shillings are not the equivalent of so much silver bullion as five sovereigns will purchase, and silver is only legal tender in England for sums under 40s.

As commerce is at present constituted, some nations tend naturally to use silver as a standard, others to use gold. Thus in most of the states of South America, where food is plentiful, wages and the prices of the necessaries of life low, and the great mass of the population has but few wants, a gold coinage would hardly circulate at all, unless the pieces were too small to be of any practical use, because the number of people who want to spend a sum equal to 10s. or £1 all at once is relatively very few. On the other hand, as a country becomes richer, it tends to adopt a gold standard, to save trouble in the carriage and handling of coin. Now in trade between a country with a gold standard and one with a silver standard, in addition to all the ordinary risks of commerce there is the uncertainty arising from the fact that the existing market ratio between the values of gold and of silver is constantly fluctuating; and (with the narrow profits gained on modern commercial transactions, taken singly) the fluctuation may make the difference between profit and loss. Such fluctuation, it is alleged, discourages trade. Still more does it discourage investment of foreign capital in silver-using countries—silver, it must be remembered, having fallen in value almost steadily since 1872. A railway in Mexico, for instance, where silver is the basis of the currency, may be owned by English shareholders, and fix its rates and fares on the hypothesis that the ratio of gold to silver will be as 1 to 20. A very slight depreciation of silver may cause a loss on exchange sufficient to reduce the dividend seriously. And a company cannot readjust its whole tariff with every variation in the price of silver. Most of all, it is said, does the system affect the European producer of goods also produced in silver-using countries. The Indian wheat grower has been accustomed to sell his wheat for export for a certain amount of silver. Silver having fallen relatively to gold, this amount is obtainable by the European purchaser more cheaply than formerly; he therefore has an inducement to purchase more Indian wheat, and so the fall in the price of silver acts as a bounty on the import of Indian wheat, which competes with the wheat of Europe. The Government of India, again, raises its revenue in silver from the Indian people, but must purchase stores and make various other payments in Europe in gold or its equivalent. Every fall in silver decreases its ability to do so; and the capacity of the mass of the Indian people to bear taxation is already strained to its utmost limits. Indian officials, too, whose pay is estimated in silver rupees, but to a great extent remitted to England to make purchases, feel acutely the fall in silver, in consequence of which 13 or 14 rupees exchange for a sovereign instead of 10 as formerly.

After the Franco-German war and the unification of Germany the silver coinage of that country was replaced by gold. Part of the demonetised silver was offered for sale—3,552,000 kilogrammes from 1873 to 1879 inclusive, while at the same time there was an increase of nearly 50 per cent. in the weight of silver obtained from the mines—chiefly in the United States—between 1876 and 1885. Moreover, the demand at the same time decreased, partly from the cessation of free coinage (or unlimited coinage on demand) in Germany, the Latin Union, and Holland: and from a

diminution in the Indian demand, due in part to the substitution of bills for silver in the remittances of the English Government to India, in part to the cessation of special causes which between 1857 and about 1871 stimulated an exceptional export of silver to that country. Thus, while in 1872 the market price of silver averaged over 59d. per oz., in 1888 it fell below 42d. Along with this has gone "the appreciation of gold" (to use Mr. Goschen's phrase), partly from increased demand by the countries which have substituted a gold for a silver standard, viz. Germany, Holland, and the Scandinavian countries; partly from increased hoarding by individuals and governments, owing to the uncertainties of the political and commercial world; partly from an increase in its use in manufactures; partly from a decrease of supply. Hence there has been a general fall in the prices of commodities, that is in their values estimated in gold. (But no doubt much of this fall is due to increased supply consequent on improved methods of production, and to that temporary over-production which always results before the new methods and machinery have driven the old out of the field; and the relative degree in which it is due to either set of causes is one of the most hotly disputed points in the controversy.)

The bimetallists therefore propose that the chief trading countries of the world shall agree to adopt a double standard—that is to allow free coinage (*see* above) of both silver and gold, fixing a ratio between them. That usually proposed is $15\frac{1}{2}$ to 1, or about the ordinary market ratio before the fall commenced; but some bimetallists are ready to accept a ratio of about 22 to 1, which more nearly represents the present state of things. The monometallists object that were both metals legal tender, debtors would at once hasten to discharge their debts in the cheaper metal, whenever a variation in the market ratio occurred. The bimetallists, however, reply that such a movement would at once check the variation; the increased demand for silver if its value fell would check the fall; and that in any case an international agreement would practically avail to keep up the ratio. Bimetallism indeed, they urge, did exist in some degree from 1868 to 1872, when the Latin Union—France, Belgium, Italy, and Switzerland—practised the free coinage of silver as well as gold, coins issued in any one of the countries being legal tender in the rest, and the same agreement is practicable on a more extended scale. Moreover, the supply of gold is not likely to increase, while the supply of silver is; and though in practice more than 99 per cent. of wholesale purchases are paid for not by gold but by bills, cheques, and other credit substitutes for money, yet the value of these depends on their convertibility into metallic standard coin at will. Hence in any monetary crisis at present there is a sudden and severe demand for gold, if only as the basis of fresh issues of bank notes. Bimetallism, therefore, it is urged, would supplement the supply of metal available for coinage in a way impossible if gold is the only standard.

It is, however, this increased supply of silver (probably capable of very great extension) which is the great difficulty of bimetallism. This part of the case against it has been effectually put by Mr. David A. Wells (*Recent Economic Changes*), and Sir Robert Giffen (*Case Against Bimetallism*). Professor Walker's *Political Economy* gives a concise and impartial sketch of bimetallism, and Major Darwin's *Bimetallism* has a fair criticism of both sides. In its support much has been written, particularly by M. Cernuschi, Mr. Hucks Gibbs, and Mr. Samuel Smith. Professor J. S. Nicholson's *Essays on Money and Monetary Problems* must also be mentioned, and a concise statement of "The case for Bimetallism" will be found in Sir Louis Mallet's *Remains* (1891). The report of the Gold and Silver Commission (1888), of which a useful summary has been published by the Bimetallic League, contains much valuable information (the commissioners were equally divided for and against bimetallism). The Reports of the Indian Currency Committee (1898–9) and the Committees of the British Association (1887–90), are also useful.

Binary Theory. The term salt was originally given to sea-salt only, and it was afterwards extended to many other substances resembling it more or less in taste and other characteristics. When it was found that bases and acids by their interaction gave rise to salts, different speculations regarding the nature of these compounds were brought forward. Berzelius stated that all compounds consisted of two parts, one electro-negative, the other electro-positive. In the case of salts of oxyacids, such as Na_2SO_4, he regarded the two parts as Na_2O electro-positive, and SO_3 electro-negative, *i.e.* an electro-positive basic oxide and an electro-negative acid oxide. Davy, however, regarded all salts as compounds of a metal with an acid radical which might be an element, as in NaCl, etc., or a group of elements. Thus in the salt above, Na_2SO_4 the two component parts would, according to Davy's view, be Na_2 and SO_4. This was called the Binary Theory of Salts, which was supported by many contemporary chemists, and afterwards by Liebig, Daniell, and Miller.

Bindweed, the name commonly applied by farmers and gardeners to the small *Convolvulus arvensis* with pink and white flowers, a tiresome field weed; to the large *Calystegia sepium*, with large white flowers, in hedgerows; and to *Polygonum Convolvulus*, the climbing buckwheat or black bindweed, an equal pest, only resembling the others in its twining mode of growth and in the shape of its leaves.

Bingen (Lat. *Bingium*), a town on the left bank of the Rhine, in the grand-duchy of Hesse-Darmstadt, a province of Rhenish Hesse, Germany. It is pleasantly situated near the confluence of the Nahe, and does a good trade in wine, grain, and cattle, having factories also for tobacco, starch, and leather. Almost opposite, in the mid-stream of the Rhine, stands the Mäuse-Thurm, with which the myth of Bishop Hatto is associated, and a little lower is the famous rapid, the Bingerloch, no longer a source of terror.

Bingham, JOSEPH, born at Wakefield, Yorkshire, in 1668. He became a fellow and tutor of

University College, Oxford, but was driven from his post by a charge of heresy unfairly urged against him for a sermon preached in St. Mary's. Dr. Radcliffe gave him a living in Hampshire, where he spent his life in the composition of his learned work *Origines Ecclesiasticæ*. He lost his all in the South Sea scheme, and died in 1723.

Binnacle (anciently Bittacle, from the French *habitacle*), the box or case which is intended to contain a ship's compass and the light which at night illuminates it.

Binney, THOMAS, was born at Newcastle-on-Tyne in 1798, and began life in a bookseller's shop. In 1824, having entered the Congregational ministry, he became pastor of Newport, Isle of Wight, whence he was invited in 1829 to the Weigh House chapel, near London Bridge. Here he founded a solid and deserved reputation, and gradually became the recognised leader of the Nonconformists as a body. Though strongly opposed to a State church, he was a man of broad culture and liberal sympathies, so that he lived on friendly terms with his ecclesiastical adversaries. He visited the United States, Canada, and Australia, and continued preaching vigorously until 1871, when he retired. His influence was directed towards improving the external qualities of Congregational services, and to that end he wrote *The Service of Song in the House of the Lord.* Among his other books the most popular are, *Is it Possible to make the Best of both Worlds?* and *Money, a Popular Exposition in Rough Notes.* He died in 1874.

Binocular, a microscope or telescope in which there are two systems of lenses, arranged one for each eye. [OPERA GLASS, MICROSCOPE.]

Binomial Theorem, a famous theorem in Algebra, which gives any power of an expression of two terms in the form of a series. Thus the fifth power of the expression $(a + b)$ may be expanded to a series of six terms. Newton proved the theorem to be generally true, for powers fractional and negative, but it should be clearly understood that there are cases where it fails, as for instance in the expansion $(1-x)^{-1}$ where x is any number greater than unity. The Binomial Theorem is only a special case of the much more general Taylor's Theorem of the higher calculus.

Bintang, an island to the S. of the Straits of Malacca. It has an area of 440 square miles, and is swampy, but produces pepper, spices, and *gambier*, a plant used in dyeing. Though nominally a possession of the Sultan of Johore, it is practically under the control of the Dutch, who have built Riauw as a rival to Singapore on a neighbouring islet.

Binturong, any individual of the genus Arctictis, of the Civet family, with a single species (*A. binturong*), ranging from Nepaul to Sumatra and Java. The binturong is a slow nocturnal arboreal short-legged animal, with a tapering prehensile tail, and having some external resemblance to the raccoons, with which it was formerly classed. Length about thirty inches from the snout to the insertion of the tail, which is about as much more. The fur is coarse and dark, with the exception of a white border to the long tufted ears. These animals are omnivorous in their diet, and are easily tamed.

Biobio, a river in Chili, South America, which, rising in the Andes, flows N.W. between the provinces of Concepcion and Arauco, and empties itself into the Pacific after a course of some 200 miles, at the port of New Concepcion.

Biogenesis, the theory that living matter is never produced but by the action of previous living matter. [ABIOGENESIS.] (The names were first coined by Professor Huxley, at the British Association, 1870.)

Biography (Greek, *a description of life*) is an account of the life and character of some actual person. The types of it are very various. A biography may be a mere chronicle of facts, like Marcellinus' *Life of Thucydides*, or Cornelius Nepos' lives (all but one of which, however, are abridgments); it may be written with a special purpose—thus, Xenophon's *Memorabilia* is written to defend Socrates' character, but not to describe his philosophical views; Sallust's *Catiline* is probably intended to whitewash Julius Cæsar, and Plutarch's lives have a religious and moral as well as a purely biographical purpose. Or it may consist largely of carefully selected table talk, as does Boswell's *Life of Johnson*—in many ways the most vivid of English biographies. Or it may describe not only the person, but his contemporaries of all sorts—like Masson's *Life of Milton.* Again, many modern biographies pay much attention to the ancestry and education of their subject, the conditions which helped to form his character, etc. Those of Schopenhauer, the German philosopher, in whose family there was insanity, and whose character and education were both very anomalous, are conspicuous instances. Probably the so-called "scientific biography" of this type has a great future before it. But the artistic biography, when really well written, is often far more truthful and more permanently valuable than many far more laborious or detailed biographies, because the insight and sympathy of the author more than supply the place of much research. On the other hand there are many very valuable biographies in which the work of the biographer consists mainly of selection and arrangement; and the book is made up of letters, etc., connected by a thread of narrative.

Biographical dictionaries deserve a passing mention. The first to be published was the French *Biographie Universelle*, consisting of 40 vols. The English Biographical Dictionary consists of 66 vols.; the German, 45 vols.; the Austrian, 60 vols.; the Dutch, 24 vols.; the Swedish, 23 vols. Though primarily sources of information, these possess some literary value. The same may be said of the biographies of men eminent in some special branch of art or science. Every great newspaper office contains many biographies of eminent living men, carefully written and frequently revised, ready for publication simultaneously with the announcement of their death.

These, too, are often of some literary value. But a fashion has arisen of late years of publishing the lives of eminent men in their lifetime. Mr. Gladstone's character has been analysed in special works alike by friends and foes; the same is true of Prince Bismarck, Lord Beaconsfield, and others; and the ablest but most hostile account of Napoleon III. was published in his lifetime in Kinglake's *War in the Crimea*.

Much biographical matter is, of course, not biographical in form—*e.g.* contemporary memoirs or histories of court and political life; or such collections of letters as those of Cicero and Madame de Sevigné; while such character sketches as are found in Shakespeare's historical plays may often be more vivid and truthful than a formal Life. Much history, too, is inseparable from biography, though the student must not fall into the error of supposing, with the late Canon Kingsley, that "history is concerned with men and women, and with nothing else." The modern scientific schools of historians would say that the reverse was nearer the truth; that the conditions which make the personages, geographical, economic, political, racial, etc., are more important, in so far as they can be assigned, than the personages by themselves; and that economic history, constitutional law, and the social and intellectual life of the masses are of more substantial importance than the conspicuous personal traits and events which stand out from the history.

Religious biographies, especially in modern times, are of special importance, partly from their numbers, and partly because they are one of the most conspicuous forms of the psychological type of biography. Unfortunately many of them are very inferior in execution, taste, and literary ability, and many of the personages are utterly unimportant in history.

But the most valuable type as a study of character is probably the autobiography (Greek *autos*, self) for its self-revelations, conscious or unconscious, of the character of its author and subject. Such a work as Rousseau's *Confessions* is a realistic study of a morbid, weak, restless, yet versatile and powerful mind. The *Journal* of Marie Bashkirtseff (q.v.) is a striking example of somewhat the same type. St. Augustine's *Confessions* and Cardinal Newman's *Apologia* are conspicuous instances of religious mind-history; Goethe's *Aus meinem Leben* is a sketch of the growth of the author's own culture and powers, of which, unfortunately, much is certainly fiction; while two of the best of recent autobiographies are that of Mark Pattison and that of John Stuart Mill—the latter mainly as a history of the growth of the religious and philosophical opinions of a man whose early training was both exceptionally severe and remarkably unsuitable.

The question as to the degree of reticence a biographer should observe as to his hero's faults has been sometimes discussed. Most biographers have glossed them over, on the principle that nothing but good should be spoken of the dead. This, however, is hardly fair to posterity. Yet to mention them may be to give them an unfair prominence above the mass of unimportant detail which makes up most of every man's life. Mr. Froude's *Carlyle* is a conspicuous instance of this latter extreme.

Biology, from the Greek *biŏs*, life, *lŏgŏs*, science, is a modern name for the science of living beings, whether animal or vegetable, expressing in its comprehensiveness the recently-acquired conviction of students of Nature that there is a fundamental unity in the life of plants and animals. Botany and zoology are but subdivisions of this science, and, as it is difficult to distinguish some of the lowest plants from the lowest animals, they are indefinite subdivisions. Modern biology concerns itself less with the detailed classification of plants and animals or with the study of their dead remains than with their life, growth, development, and mutual relations as living beings. We can here only indicate the leading questions or groups of questions which form the subject-matter of the science.

Firstly, in defining the province of biology we have to attempt to explain the nature of life itself [LIFE], which we do by investigating the general properties of living bodies, and especially those distinguishing them from non-living bodies. Thus, true or active vitality is unknown to us in the absence of a certain extremely complex chemical substance, or rather mixture of substances, containing carbon, hydrogen, oxygen, nitrogen, and traces of sulphur, and known as protoplasm (q.v.). This substance is unknown except in living beings. Protoplasm is during active life constantly decomposing into such simpler substances as carbonic acid, water, and ammonia, which may be excreted by the organism. This decomposition, known as katabolism (q.v.), is, however, accompanied by a power of self-restoration, by the taking in of suitable simple nutritive matters and the building of them up (anabolism) into new protoplasm. This is the chemical aspect of life, and such life can only occur at certain temperatures (varying with the kind of organism) and in the presence of moisture, oxygen, and other food-material. If the anabolism, or building up of protoplasm, does not equal the katabolism, we have death, local or systemic; if it exceeds the katabolism, we have growth. The growth of living beings differs from that of inanimate matter (accretion) in that it almost invariably results in the production of a variety or heterogeneity of structure, which we term organisation, and this organisation is accompanied by a variety of function, or physiological division of labour. Living beings have commonly curved surfaces, which contrast with the plane faces of crystalline minerals. That division of biology that deals with form is termed Morphology (q.v.); that which deals with structure, Anatomy (q.v.); and that which deals with function, Physiology (q.v.). When the growth of a living being has reached a certain stage it may become discontinuous, the separated portion forming a new individual. This is Reproduction (q.v.). All the functions of an organism may be classified as those of nutrition (including alimentation and growth), those of reproduction, and those of relation (including sensation, the senses and motion), which are subsidiary to the

others, bringing the living being into relation with its surroundings. The latter, as more distinctive of animals, are sometimes called the animal functions.

Whilst the protoplasm of living beings gives rise to many chemical compounds unknown in inanimate nature, a yet more striking characteristic which it generally exhibits is that of being divided up into more or less distinct minute masses or structural units known as cells (q.v.). Plants differ from animals in having their cells commonly enclosed by a membrane or cell wall of simpler composition. Similar cells may be grouped together into what are termed tissues, and that branch of anatomy which deals with cells and tissues is termed histology (q.v.).

The lowest plants and animals consist of a single cell, or are unicellular, and multiply by simple fission [SCHIZOPHYTA], and the higher plants and animals all begin their individual existence as a single cell, ovum, or egg-cell. In these latter this cell by division gives rise to more complex structures, certain parts or organs being gradually shaped for the performance of certain functions. Whilst the germs or embryos of large classes of plants or animals resemble one another, as they develop they become more and more unlike, resembling, that is, the members of smaller and smaller sub-classes. This is Von Baer's law that ontogeny, or individual development, recapitulates phylogeny, or the history of the evolution of the race. It is no contradiction of this principle of progressive evolution that we find cases of degeneration (q.v.), parasites, for instance, often losing many organs which their easy mode of life renders superfluous. Thus biology has to deal with embryology (q.v.), and with classification (q.v.) as the tabulated result of phylogeny. This study is facilitated by that of the fossil remains of organisms now extinct, the ancestors of those now living. [PALÆONTOLOGY.]

Whilst nutrition serves to maintain the life of the individual, and reproduction to provide one or more new individuals to succeed it at its death, the increase thus brought about inevitably leads to dispersal, and organisms have many structures, such as organs of flight, adapted to that end. Thus the struggle for existence has led to the existing geographical distribution [DISTRIBUTION] of plants and animals.

Biology has also to deal with many complex questions as to the relations of different classes of organisms to one another, such as those of symbiosis, parasitism, protective mimicry, the pollination of flowers by insects, etc., referred to under these various heads.

Lastly we have the great problems of *ætiology*, or the causes of biological phenomena, such as the origin of living matter, the possibility of spontaneous generation or abiogenesis (q.v.) at the present time, and the origin of the existing specific differences between organisms whether by creation (q.v.) or by descent with variation. [DARWINISM, EVOLUTION, and VARIATION.]

The practical study of biology in this country generally begins with the examination, both anatomical and physiological, of selected types of the great divisions of the animal and vegetable kingdoms, noting their likenesses and unlikenesses.

Bion, the Greek bucolic poet, was born somewhere near Smyrna, and was probably a contemporary of Theocritus, and somewhat senior to Moschus, who wrote a sketch of his life, which was apparently passed in Sicily. It is said he died of poison administered by jealous rivals. The fragments left of his works show little affinity with the pastorals of his brother poets. He is more thoughtful and refined, and hardly touches on rural matter. His *Epitaph of Adonis* is his best-known work.

Bioplasm (from *bios*, life, and *plasma*, that which is capable of being fashioned), a term due to Professor Lionel Beale, signifying formative or germinal matter.

Biot, JEAN BAPTISTE, was born at Paris in 1774, and at first entered the artillery, but his fondness for science led to his being sent to the École Polytechnique. He was presently appointed professor of mathematics at Beauvais, and became the friend of Laplace. In 1800 he was called to the chair of natural philosophy in the College of France. He assisted Gay-Lussac in his balloon experiments, and undertook with Arago the measurement of an arc of the meridian between the Pyrenees and Formentera. This he joined ten years later to the measurements effected in England and Scotland for the trigonometrical survey. In 1808 he devoted himself to the study of the phenomena of polarised light, making several important discoveries almost simultaneously with Seebeck and Brewster. He died in 1862.

Biped, a term popularly applied to man, and to such of the lower animals as use only the pelvic limbs for progression on the ground. The term is sometimes used of any of the Chordata (q.v.), in which only two limbs are present (as in the Cetacea and Sirenia, and some lizards and fish), whether these limbs are pectoral or pelvic, *i.e.* corresponding to the human arm or leg.

Bipinnaria, the common larva of the starfish.

Biplane. [AEROPLANE, AERONAUTICS.]

Biquadratic, an algebraic expression, in which the highest power occurring is the fourth. Similarly, a biquadratic equation is one in which the fourth power of the unknown quantity is the highest that occurs. The theory of equation then shows us that there are four roots to such an equation, all of which may be obtained by special methods.

Birbhum, a district and town in the Bardwan division of Bengal, British India. The former lies S. of Bhagalpur, and N. of the Bardwan district, from which it is divided by the river Ajai. The area is 1,344 square miles, and it is densely populated. Towards the E. extends the alluvial plain of the Ganges, producing abundance of rice, grain, sugar, oil-seeds, and silk. Hilly jungles occupy much of the country to the W. and N. Coal and iron are found. The town, also called Suri, is only important as being the administrative centre.

Birch, the general name for the trees and shrubs forming the genus *Betula* in the order *Betulaceæ*. The genus includes some 25 species, natives of northern latitudes. They have slender branches; scattered, serrate, deciduous leaves; and catkins both male and female produced on the same tree simultaneously with the leaves. The male catkins fall off whole, whilst the female ones come to pieces, liberating the little winged fruits. In most of the species, as in the common British forms, the bark is marked by long transverse lenticels and flakes off in thin sheets. This renders it a tree suited to smoky towns. *Betula alba*, our species, seldom exceeds a foot in diameter. It has deltoid leaves on long petioles. It forms extensive forests in Russia and Siberia, and extends far northward and to an altitude of 2,500 feet in the Scottish Highlands. Its wood is used by turners, carriage-builders, and upholsterers, as firewood, and for charcoal; its branches for brooms; its bark for roofing, for making boxes, jars, and shoes, for tanning Russia leather, and even by the Samoyedes as a bread-stuff; its leaves by the Finlanders as tea; and its sugary sap, when fermented, as a wine or spirit. *B. lenta*, the black birch of Canada, reaches a height of 60 or 70 feet, and a diameter of 2 or 3 feet: *B. papyracea*, the canoe or paper birch of the same country, though becoming stunted beyond the arctic circle, grows in latitude 70° N., and the Himalayan *B. Bhojputtra* occurs at a height of 9,000 feet.

BRANCH OF BIRCH WITH CATKINS.

Birch, SAMUEL, LL.D., was born in London in 1813, being the son of a rector of St. Mary Woolnoth. He was educated at Merchant Taylors' and other schools, and in 1834 was employed by the Commissioners of Public Records. Two years later he entered the Department of Antiquities in the British Museum, and in 1861 was appointed keeper of the Oriental antiquities. As an Egyptologist Dr. Birch acquired a high reputation, writing an *Introduction to the Study of Hieroglyphics*, a *History of Ancient Pottery*, and a *Selection of Hieratic Papyri*, besides translating Bunsen's important work and editing other valuable publications. He contributed much to the study of Biblical archæology. He never visited Egypt or the East, and so was not associated with any original discoveries. He received honorary degrees from Oxford and Cambridge and many other distinctions, and died in 1885.

Birch, THOMAS, was born in London in 1705, of a Quaker family, and was intended to make coffee-mills, as his father had done. However, his tastes lay in another direction, and by hard work he qualified as a clergyman of the Established Church, and, obtaining the patronage of Lord Hardwicke, received valuable preferments, the last being the rectory of Debden, Essex. He was also private chaplain to Princess Amelia. But it was as an antiquarian and literary man that he acquired fame. In 1735 he was made F.R.S., and from 1752 to 1765 was secretary to the Royal Society, of which he wrote a history. He was also a trustee of the British Museum, to which he left his library. His works were very numerous, and covered a wide range of subjects, but none of them possess lasting interest. He was killed by a fall from his horse in 1765.

Birch-Pfeiffer, CHARLOTTE, was born at Stuttgart in 1800, and first appeared on the stage at Munich in her thirteenth year. Marrying in 1825 Mr. Birch of Copenhagen, she added his name to her own. She enjoyed considerable success as an actress, and in 1838 assumed the management of the Zurich theatre, and in 1849 took a permanent engagement at the theatre royal, Berlin. Many popular dramas, besides novels and sketches, came from her pen. She died in 1868.

Bird, GOLDING, M.D., was born in 1815, and entered the medical profession, taking his degree at the university of St. Andrew's, and obtaining the fellowship of the College of Physicians, London. He was attached to the medical school of Guy's hospital, and in 1844 published a remarkable work on renal diseases and the functions of the kidney. His labours vastly extended the scope of diagnosis in disorders connected with that organ, and he at once sprang into a great practice, receiving, too, the fellowship of the Royal Society. Unhappily his overtaxed constitution was undermined by the very malady which he had made his special study, and he died in 1854.

Bird, or BYRD, WILLIAM, was born about 1540, and became in 1563 organist of Lincoln cathedral. He studied under Tallis, with whom in 1575 he was appointed organist to Queen Elizabeth and gentleman of the Chapel Royal. He was the earliest English composer of madrigals, and he also wrote many sacred pieces, some of which appeared in Elizabeth's *Virginal Book*, others in independent collections. They are said to display remarkable freedom and elegance. To him is ascribed the well-known round or vocal canon *Non Nobis Domine*. He died in 1623.

Bird Cherry (*Cerasus Padus*), known in Scotland as the hagberry, is a small tree differing from

other British species of cherry in having its flowers in terminal racemes. Its fruit is small, black, and bitter.

Bird-lime, a sticky, viscid substance, used by bird-catchers. The bird-lime is spread on twigs, and around a cage containing a decoy bird. The birds, attracted by the singing of the decoy, alight on the prepared twigs, from which they are unable to extricate themselves. It may be prepared by bruising holly bark, boiling with water, and allowing to stand for some weeks; or from flour, by immersing in water in a calico bag, and squeezing out the starch; also by boiling linseed oil until the desired consistency is obtained.

Birds, the class *Aves*, as generally understood by systematic zoologists, but of late years classified with the reptiles in one large order, *Sauropsida* of Huxley. Although apparently so different in external appearance from the *Reptilia*, birds are but highly modified reptiles, when the characters of their osteology and comparative anatomy are taken into account. The chief outward difference consists in the fact that birds have feathers, which no reptile possesses. Their young, likewise, are hatched from eggs, but this is by no means a character peculiar to birds, for it is now known that among the mammalia the Ornithorhynchus produces its young from an egg, while turtles and crocodiles and many snakes also lay eggs. Birds may, therefore, be described as warm-blooded, oviparous, vertebrate animals, clothed with feathers.

The earliest fossil remains of any form of bird have been found in the Jurassic rocks of Bavaria (Archæopteryx); they have also been discovered in the Cretaceous, Eocene, Miocene, and all the later deposits both of this country and abroad.

It has been ascertained beyond all doubt that the most ancient birds possessed teeth, and that the feathers, though veritable plumes, were not quite of the same character as those observed in the birds of the present epoch. Thus the *Archæopteryx*, the wonderful fossil form of extinct bird-life discovered in the lithographic slate of Solenhofen in Bavaria, had an enormously long tail, exceeding the length of the body itself, and furnished with *lateral* plumes along its entire extent. Hence it has been proposed by Professor Gill in America to divide birds into two main divisions, one of which would comprise the lizard-tailed *Saururæ*, represented by *Archæopteryx*, while the great mass of birds would be called *Euriphidurœ*, or fan-tailed birds, wherein the tail is spread, or at least arranged, on the plan of a fan. Two other groups of birds are recognised by naturalists, the *Odontormæ* and the *Odontoleœ*, both represented by extinct forms, which also possessed teeth.

In the time of Linnæus, and for a generation or two afterwards, the class "Aves" was arranged according to external and visible characters only. Thus an early plan was to separate the feathered tribes into "Land" birds and "Water" birds. Then followed the division into raptorial birds, perching birds, game birds, wading birds, swimming birds, etc., with many subdivisions such as fissirostral or wide-gaping birds, scansorial or climbing birds, etc. But as the study of science advanced many other characters were found to be of importance; for instance, the pterylography or arrangement and structure of the feathers, the shape of the sternum, and the general osteology. A great influence for good was exercised by the publication of Darwin's *Origin of Species*, and the geographical distribution of birds began to be zealously studied. In 1867 Professor Huxley published his classification of birds, in which many previously unknown characters were brought to light, and this important publication underlies all the recent systematic work of ornithologists who have attempted to arrange the class "Aves." Much has been done since by Parker, Garrod, Forbes, Fürbenger and Gadow, to add to Huxley's foundation; and in all recent arrangements of the birds, osteological and anatomical characters have been chiefly relied on, somewhat to the neglect of the external form and the habits of species, which are also of equal importance in determining what the affinities of a bird really are.

Huxley divides the class "Aves" into three large orders:—

1. *Saururæ* (lizard-tailed birds—the fossil *Archæopteryx*).
2. *Ratitæ* (flightless birds which have no keel to the sternum—*Ostriches, Rheas, Emeus, Apteryx*).
3. *Carinatæ*. All the remaining families of birds which possess a keel to the sternum.

An exception is seen in the case of the owl-parrot of New Zealand (*Stringops habroptilus*), which has completely lost the power of flight, so that the keel of the sternum, being no longer of use for the attachment of the pectoral muscles, has become in process of time obsolete.

The *Ratitæ* consists of the ostrich and its allies, *i.e.* the struthious birds as they are generally called. By many systematists they are considered to be the most ancient type of bird which survives at the present day, and are supposed to indicate the forerunners of all the forms of bird-life now on the earth. That they are of ancient origin is undoubted, but it is more probable that they point to an early departure from the reptile-like birds of a long past epoch. They apparently spring from a stock which once had amply developed wings, which through disuse have gradually become aborted, development of the legs and running power being correspondingly increased. It has been stated that in the embryo ostrich the development of the wings proceeds at first as in other birds, but that after a time the growth ceases and the development of the legs proceeds at the expense of the wings. The kiwis (*Apteryx*) of New Zealand also belong to the struthious birds according to their osteology, but in habits they are akin to rails (*Ralli*).

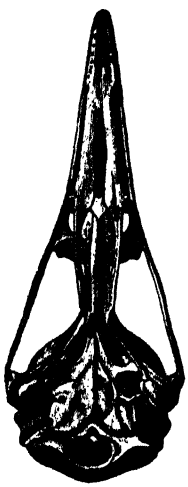
Of the carinate birds, the Tinamous (*Crypturi*, or Tinami) have a struthious palate, in which the vomer is united in front of the broad maxillo-palatine plates, as in the Emeu; while its shape and attachment behind is also like that of the struthiones. This peculiarity has induced Huxley to call the Tinamous "Dromæognathous."

A second arrangement of the palatine bones is called by Huxley "Schizognathous." In these

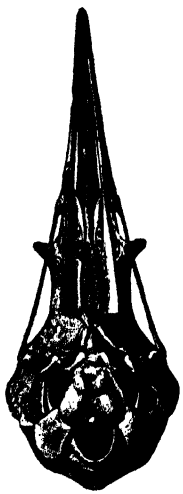
birds the vomer tapers to a point anteriorly, and divides the maxillo-palatine bones, which in consequence do not coalesce. Such are plovers, gulls, etc.

The third arrangement of the palatine bones is "Desmognathous," and here the vomer tapers to a point anteriorly, but the maxillo-palatines are united across the middle line. Hawks, ducks, etc., are characteristic Desmognathous birds.

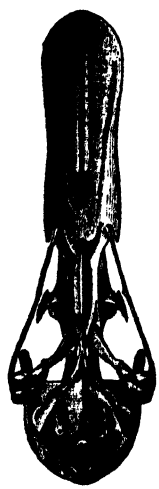
Lastly, the great mass of passerine birds have an "Ægithognathous" palate, intermediate in type between the "Schizognathous" and "Desmognathous" forms. The vomer is truncated in front, and deeply-cleft posteriorly, so as to embrace the sphenoidal rostrum. The maxillo-palatines do not unite with each other or with the vomer.



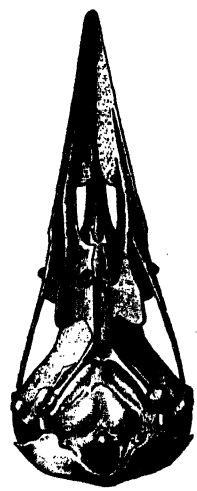
VENTRAL ASPECT OF SKULL OF TINAMOU, TO SHOW THE STRUTHIOUS PALATE.



VENTRAL ASPECT OF SKULL OF GOLDEN PLOVER, TO SHOW THE SCHIZOGNATHOUS PALATE.



VENTRAL ASPECT OF SKULL OF COMMON TEAL, TO SHOW THE DESMOGNATHOUS PALATE.



VENTRAL ASPECT OF SKULL OF ROOK, TO SHOW THE ÆGITHOGNATHOUS PALATE.

As before mentioned, Huxley's *Dromæognathæ* contain only the tinamous. The *Schizognathæ* include all the plovers and gulls, cranes, rails, petrels, divers, grebes, penguins, game-birds, and pigeons. The *Desmognathæ* comprise all the herons, storks, ducks, flamingoes, pelicans and allies, birds of prey, parrots, and the bulk of what are known as Picarian birds (cuckoos, kingfishers, trogons, etc.). The *Ægithognathæ* contain the passerine birds, with the swifts, humming-birds, and goatsuckers.

Several classifications of birds have been proposed since Huxley's time, but none have produced such important alterations in the line of study. The most celebrated is that of Fürbringer, which is the result of many years of labour, and is the most comprehensive work on the anatomy and morphology of birds. Dr. Bowdler Sharpe has recently passed in review all the schemes of classification published during the last twenty-five years, and, as a result, he has proposed to the meeting of the second Ornithological Congress at Budapest, held in May, 1891, the following linear arrangement:—

CLASS AVES.

SUB-CLASS I.—Saururæ.

Order I.—Archæopteryx (fossil).

SUB-CLASS II.—Ratitæ.

Order II.—Rheiformes (Rheas).
" III.—Struthioniformes (Ostriches).
" IV.—Casuariiformes (Casowaries and Emeus).
" V.—Apteryges (Kiwis).

SUB-CLASS III.—Carinatæ.

Order VI.—Crypturiformes (Tinamous).
" VII.—Galliformes (Game-birds).

Sub-order Megapodii (Megapodes).
" Craces (Curassows).
" Phasiani (True Game-birds).

Family Phasianidæ (Pheasants).
" Tetraonidæ (Grouse).
" Perdicidæ (Partridges).
" Numididæ (Guinea-Fowls).
" Meleagridæ (Turkeys).

Sub-order Hemipodii (Hemipodes).
" Pterocletes (Sand-Grouse).

Order VIII.—Columbiformes (Pigeons).
" IX.—Opisthocomiformes (Hoatzins).
" X.—Ralliformes (Rails).

Family 1.—Gallinulidæ (Water-Hens).
" 2.—Rallidæ (True Rails).
" 3.—Ortygometridæ (Cranes).
" 4.—Podicæ (Fin-Foot).

Order XI.—Heliornithiformes (Sun-Grebe).
" XII.—Podicipitidiformes (Grebes).
" XIII.—Colymbiformes (Divers).
" XIV.—Sphenisciformes (Penguins).
" XV.—Procellariiformes (Petrels).

Family 1.—Diomedeidæ (Albatrosses).
" 2.—Procellariidæ (True Petrels).
" 3.—Pelecanoididæ (Diving Petrels).

BIRDS

1 & 1A. ARCHÆOPTERYX. 2. OSTRICH. 3. KIWI. 4. PELICAN. 5 PENGUIN. 6. GULL. 7. PLOVER. 8. CURLEW. 9. PHEASANT. 10. EAGLE 11. OWL. 12. BIRD OF PARADISE. 13. VULTURE. 14. CROW. 15. TROGON. 16. COCKATOO. 17. SWALLOW. 18. KINGFISHER. 19. WOODPECKER.

Order XVI.—Alciformes (Auks).
„ XVII.—Lariformes.
Family 1.—Stercorariidæ (Skuas).
„ 2.—Laridæ (Gulls and Terns).
Order XVIII.—Charadriiformes.
Sub-order Dromades (Crab-Plovers).
„ Chionides (Sheath-bills).
„ Attagides (Quail-Plovers).
„ Charadrii (True Plovers).
Family Hæmatopodidæ (Oyster-catchers).
„ Charadriidæ (Plovers).
„ Scolopacidæ (Snipes).
Sub-order Glareolæ (Pratincoles).
„ Cursorii (Coursers).
„ Parræ (Jacanas).
„ Œdicnemi (Thick-knees).
„ Otidides (Bustards).
Order XIX.—Gruiformes.
Sub-order Grues (Cranes).
„ Arami (Courlans).
„ Rhinochetides (Kagus).
„ Mesitides (Ground-Herons).
„ Eurypygæ (Sun-Bitterns).
„ Psophiæ (Trumpeters).
„ Dicholophi (Seriamas).
Order XX.—Pelargiformes.
Sub-order Ardeæ (Herons).
„ Ciconii (Storks).
„ Balænicipitides (Shoe-bills).
„ Scopi (Umbres).
„ Plataleæ.
Family Plataleidæ (Spoonbills).
„ Ibididæ (Ibises).
Order XXI.—Phœnicopteriformes (Flamingoes).
„ XXII.—Anseriformes.
Sub-order Anseres (Ducks and Geese).
„ Palamedeæ (Screamers).
Order XXIII.—Pelecaniformes.
Sub-order Phathontes (Tropic-birds).
„ Sulæ (Gannets).
„ Phalacrocoraces.
Family Phalacrocoracidæ (Cormorants).
„ Plotidæ (Darters).
Sub-order Pelecani (Pelicans).
„ Fregati (Frigate-birds).
Order XXIV.—Cathartidiformes (Turkey Buzzards).
„ XXV.—Accipitriiformes.
Sub-order Serpentarii (Secretary-birds).
„ Accipitres.
Family Vulturidæ (Vultures).
„ Falconidæ (Hawks).
Sub-order Pandiones (Ospreys).
„ Striges (Owls).
Order XXVI.—Coraciiformes.
Sub-order Steatornithes (Oil-birds).
„ Podargi (Frog-mouths).
„ Leptososmati (Kirombos).
„ Coraciæ (Rollers).
„ Halcyones (Kingfishers).
„ Bucerotes (Hornbills).
„ Upupæ (Hoopoes).
„ Meropes (Bee-eaters).
„ Momoti (Mot-mots).
„ Todi (Todies).
„ Caprimulgi (Goatsuckers).
„ Cypseli (Swifts).
„ Trochili (Humming Birds).
„ Colli (Colies).
Order XXVII.—Trogones (Trogons).
„ XXVIII.—Coccyges.
Sub-order Musophagi (Tourakoes).
„ Cuculi (Cuckoos).
Order XXIX.—Psittaciformes.
Family Nestoridæ (Nestors).
„ Loriidæ (Lories).
„ Cyclopsittacidæ (Lorikeets).
„ Cacatuidæ (Cockatoos).
„ Psittacidæ (True Parrots).
„ Stringopidæ (Owl-Parrots).
Order XXX.—Scansores.
Sub-order Rhamphastides (Toucans).
„ Capitones (Barbets).
„ Indicatores (Honey-Guides).
Order XXXI.—Piciformes.
Sub-order Pici (Woodpeckers).
„ Buccones (Puff-birds).
„ Galbulæ (Jacamars).
Order XXXII.—Menuræ (Lyre-birds).
„ XXXIII.—Eurylæmi (Broad-Bills).
„ XXXIV.—Passeriformes.
Section A.—Oscines.
Family 1.—Corvidæ (Crows).
„ 2.—Paradiseidæ (Birds of Paradise).
„ 3.—Ptilonorhynchidæ (Bower-birds).
„ 4.—Sturnidæ (True Starlings).
„ 5.—Eulabetidæ (Tree-Starlings).
„ 6.—Eurycerotidæ (Blue-bills).
„ 7.—Dicrurida (Drongos).
„ 8.—Oriolidæ (Orioles).
„ 9.—Icteridæ (Hang-nests).
„ 10.—Ploceidæ (Weaver-birds).
„ 11.—Tanagridæ (Tanagers).
„ 12.—Cerebidæ (American Creepers).
„ 13.—Fringillidæ (Finches).
„ 14.—Alaudidæ (Larks).
„ 15.—Motacillidæ (Wagtail and Pipits).
„ 16.—Mniotiltidæ (American Warblers).
„ 17.—Certhiidæ (Creepers).
„ 18.—Meliphagidæ (Honey Suckers).
„ 19.—Dicæidæ (Flower-Peckers).
„ 20.—Zosteropidæ (White-Eyes).
„ 21.—Paridæ (Tits).
„ 22.—Regulidæ (Gold-Crests).
„ 23.—Laniidæ (Shrikes).
„ 24.—Artamidæ (Swallow-Shrikes).
„ 25.—Ampelidæ (Wax-wings).
„ 26.—Vireonidæ (Greenlets).
„ 27.—Sylviidæ (Warblers.)
„ 28.—Turdidæ (Thrushes).
„ 29.—Cinclidæ (Dippers).
„ 30.—Troglodytidæ (Wrens).
„ 31.—Mimidæ (Mocking Birds).
„ 32.—Timeliidæ (Bush-Babblers).
„ 33.—Pycnonotidæ (Bulbuls).
„ 34.—Campophagidæ (Cuckoo-Shrikes).
„ 35.—Muscicapidæ (Fly-catchers.)
„ 36.—Hirundinidæ (Swallows).
Section B.—Oligomyodi.
Family 1.—Tyrannidæ (Tyrants).
„ 2.—Oxyrhamphidæ (Sharp-bills).
„ 3.—Pipridæ (Manakins).
„ 4.—Cotingidæ (Chatterers).
„ 5.—Phytotomidæ (Plant-cutters).
„ 6.—Philepittidæ (Velvet-thrushes).
„ 7.—Pittidæ (Ant-thrushes).
„ 8.—Xeniscidæ (Bush-wrens).
Section C.—Tracheophonæ.
Family 1.—Dendrocolaptidæ (Spine-Tails).
„ 2.—Formicaridæ (Ant-birds).
„ 3.—Pteroptochidæ (Tapacolas).
Section D.—Passeres abnormales.
Family 1.—Atrichiidæ (Scrub-birds).

Bird's-foot Trefoil (*Lotus corniculatus*), a low-growing perennial leguminous plant, forming a useful ingredient in pasture vegetation. It has leaves of five leaflets, two of which are stipular, and an umbellate inflorescence of from five to ten yellow

or orange flowers, followed by straight pods, the resemblance of which to birds' claws gives the plant its popular name.

Bird's-head Corallines, bryozoa of two or three species of the genus *Bugula*, so named from the prominence of the bird's-head processes found upon them. They are common on the English coast, growing as fan-shaped tufts, or as series of such tufts, rising as a corkscrew spiral to a height of two or three inches.

Bird's-head Processes are certain individuals in a Bryozoan colony, which are modified into the shape of birds' heads, and which are used as prehensile organs. They are technically termed avicularia. See also "pedicellariæ," similar structures in the Sea-urchins and Starfish.

Birds of Paradise, the popular name of any species or bird of the Passerine family Paradiseidæ, almost entirely confined to New Guinea and the adjacent Papuan Islands, a single species being found in the Moluccas and one in North Australia. Pigafetta, who accompanied Magellan, is said to have been the first to make Europeans acquainted with these birds, round which from the first a cloud of legend gathered. The Portuguese called them *Passaros de Sol*, or birds of the sun; the Dutch traveller Linschooten (1553–1633) says that no one has seen these birds alive, for they live in the air, always turning towards the sun, and never lighting on the earth till they die, for they have neither feet nor wings. It was also gravely asserted that they lived on dew and nectar, that they took their rest "suspended to branches of trees by those threads in their tails," and that the young were hatched in a cavity on the back of the male. The legend that these birds were legless and wingless arose from the fact that those who first described them had only seen imported skins, prepared in native fashion by cutting off the limbs, skinning the body up to the beak, and taking out the skull, and Linnæus commemorated the fable in the specific name *apoda* = footless, which he gave to the Great Bird of Paradise.

The Birds of Paradise are of moderate size, allied in structure and habits to the crows, from which they differ in the proportions of the toes, but characterised by an extraordinary development of plumage unequalled in any other family. The intensity of its colour and metallic lustre is not surpassed even by that of the humming birds. The family is usually divided into two groups—the Paradiseinæ, True Birds of Paradise, and the Epimachinæ, Long-billed Birds of Paradise (q.v.). The following are the genera and species of the True Birds of Paradise, as given by Wallace:—

1. *Paradisea.*—The Great Bird of Paradise (*P. apoda*), 17 in. or 18 in. from the beak to the tip of tail. Body, wings, and tail rich coffee-brown, deepening on the breast; top of head and neck straw-yellow, lower part of throat rich emerald with metallic lustre. The two middle feathers of the tail are webless, except at the base and tip, and spread out in a double curve. On each side beneath the wings there is an erectile tuft of golden orange plumes. The females and young males have the whole plumage coffee-brown. From the Aru Islands and Central New Guinea. *P. novæguineæ*, from the south of New Guinea, is closely allied. The Lesser Bird of Paradise (*P. papuana*), probably ranging over New Guinea, is much smaller, of lighter brown hue, and with more yellow in the plumage. Its plumes are used for ladies' head-dresses. *P. finschi*, from the south-east of New Guinea, the Red Bird of Paradise (*P. rubra*) from Waigiou and Batanta. *P. decora*, from the D'Entrecasteaux Islands. *P. raggiana*, from the south-east of New Guinea, and *P. Gulielmi II.*, from German New Guinea, are other forms.

2. *Cicinnurus.*—The single species of this genus, the King Bird of Paradise (*C. regius* = *Paradisea regia*, Linn.), ranges over the whole of New Guinea, Mysol, and the Aru Islands. Length about 6½ in., head, throat, and upper surface glossy crimson red, breast and belly white, marked off from the red of the throat by a broad metallic green band. On each side beneath the wing is a tuft of ashy feathers bordered with green, which can be erected into a semicircular fan. The two middle tail-feathers are webless except at the extremity, where the emerald web is coiled into a spiral disc. The females and young males are of a dull earthy-brown.

3. *Diphyllodes.*—The Magnificent Bird of Paradise (*D. speciosa*), from the north-west of New Guinea and Mysol, has a curious mass of straw-yellow feathers on the upper part of the back. The two middle tail feathers are elongated, and, crossing, form two circles. In paying court to the females the males erect all their feathers, the skin of the neck is inflated, and the head seems like the centre of a glory, formed beneath by the expanded feathers of the breast, and above by those of the yellow mantle, which are spread out vertically like a fan. Other species are *D. wilsoni*, the Red Magnificent, from Waigiou; *D. chrysoptera*, from the south-east of New Guinea; *D. jobiensis*, from Jobie Island; *D. hunsteini*, from the south-east of New Guinea; and *D. Gulielmi III.*, with a green-tipped erectile fan, from the east of Waigiou.

4. *Lophorhina.*—The Superb Bird of Paradise (*L. atra*), from the north-west of New Guinea. The plumage is of an intense black, with bronze reflections; on the breast is a bluish-green shield shaped like an inverted V, and from the nape springs a larger V-shaped shield of velvety black feathers, with purple and bronze reflections. *L. minor*, from the south-east, is another form.

5. *Parotia.*—The Golden, or Six-shafted Bird of Paradise (*P. sexpennis*), from the north-west of New Guinea, is a small bird, with generally black plumage, glossed with bronze and purple. From each side of the head spring three shafts some 6 in. long, with an oval web at the tip, and on each side of the breast is an erectile tuft of soft feathers. *P. lawesi*, from the south-east of New Guinea, differs slightly in the form of the breast plumes.

6. *Semioptera.*—The Standard-wing (*S. wallacei*) from Gilolo and Batchian, has ashy-olive plumage, with long creamy-white plumes springing from tubercles close to the upper end of the bend of each wing.

7. *Paradisornis.*—There is only one species (*P. rudolphi*), a form from the south-east of New Guinea, with bright blue side plumes, and the middle tail-feathers elongated and spatulate at the lips. [MANUCODE.]

These birds are practically omnivorous, but fruit and insects constitute their chief food. Of their habits in a state of nature very little is known, beyond the fact that they are extremely active and more or less gregarious. The males of the Great Bird of Paradise hold what the natives call "dancing parties" in trees, and then display their charms to the female birds. While they are so occupied the natives shoot them with blunt arrows, so as not to injure the plumage. There is every probability that the other species show themselves off in a somewhat similar manner. The Texans give the name of Bird of Paradise to *Milvulus forficatus*, the Swallow-tail Fly-catcher, or Scissortail (q.v.).

Birds of Prey, the Aëtomorphæ of Huxley, the Accipitres and Raptores of older systematists. The birds of this group have muscular bodies, short robust legs, generally with three toes in front and one behind, all armed with long curved claws; the wings are of considerable size, for the most part pointed, and the flight is generally swift and powerful. The bill is strong, and sharply hooked; the upper mandible is the longer, and is often armed with a projection, called by Owen a "lateral tooth." The Birds of Prey are monogamous, and the male is smaller than the female. They generally nest in lofty and sometimes in inaccessible places; the eggs are rarely more than four, and the young, when hatched, are covered with down and helpless. The order contains the Eagles, Falcons, Hawks and Vultures, sometimes called the Diurnal, and the Owls or Nocturnal Birds of Prey.

Biretta, an Italian name for the old English barret-cap, the French *barrette*, the ancient academical cap: a tall skull-cap of silk or velvet, the sides stiffened with pasteboard, and the upper part pinched into three or four ridges by which it can be held. Its present form, in which these ridges are stiff and the top surmounted by a button, dates from the 17th century. (In the Roman Catholic Church that of priests is black, that of bishops purple, and that of cardinals red.) Occasionally it is worn by the Anglican High Church clergy.

Birkbeck, GEORGE (1776–1841), the founder of the Birkbeck Institute, devoted himself to the medical profession, and in 1799 was appointed Professor of Natural Philosophy in Glasgow. He took a keen interest in the formation of Institutes for London Mechanics.

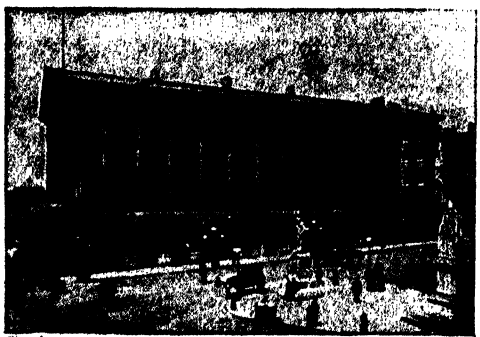
Birkenfeld, a principality of W. Germany, assigned to Oldenburg by the treaty of Vienna, but actually enclosed in Rhenish Prussia. The area is 143 square miles, most of it being covered by hills and forests. The principal river is the Nahe. Cattle, hemp, flax, and oil seeds are the chief products, but coal and iron are worked to some extent. The chief town has the same name, and stands about 25 miles S.E. of Trèves. It manufactures linen, woollen, and leather goods.

Birkenhead, a municipal and parliamentary borough and market town of Cheshire, on the left bank of the Mersey, opposite to Liverpool, with which it is connected by steam ferries and the Mersey tunnel railway. From a fishing village in 1821 it has become a very large and thriving manufacturing town. The first dock was opened in 1847, and now the area of the basins is 170 acres, and the quay accommodation amounts to over 10 miles. Immense ship-building establishments have been created here—notably that of Messrs. Laird—some of the largest vessels afloat being turned out from these yards. Other castings and forgings are executed on a large scale. A considerable general trade is also carried on in coal, guano, grain, etc. The town possesses a fine park and handsome public buildings, among them being the industrial schools raised in memory of Prince Albert. The Great Western and London and North-Western Railways have stations here. St. Aidan's theological college (Anglican) is in the suburbs. Pop. (1909), 120,000.

Birlâs, a Tatarised Mongolian tribe, settled in Transoxiana since the twelfth century. Timur Beg (Tamerlane) was son of the chief of this tribe, who resided at Kesh, 30 miles S. of Samarkand, where Timur was born in 1336.

Birmingham, a city and municipal and parliamentary borough in Warwickshire, 102 miles N.W. of London, with suburbs extending into Staffordshire and Worcestershire. It is in size and population the fifth town in the United Kingdom, having risen into importance since the great Civil war, owing to its proximity to the great coal and iron fields of the Midlands. The population in 1801 was 73,300, and is now over half a million (558,357, estimated to the middle of 1908). It was not, however, represented in Parliament until 1832, but since 1885 has had seven members. In 1904 it was created a bishopric. The prosperity of the place mainly rests upon metal manufactures. Gun-barrels and swords are made in great quantities, brass-wares, jewellery, electro-plate, bicycles and motors, railway plant and stock tools of all kinds, screws, nails, pins, and bells are among the staple products. There are large glass and papier-maché works, and factories for dealing with wood and leather in connection with the leading hardware trades. An interesting factor in the development of these great industries has been the non-existence in the town of the guilds, companies, and other restrictive institutions that fettered freedom elsewhere. To this same cause must be attributed the independent and liberal spirit of the working classes, and their generally prosperous and contented state. Whilst colossal fortunes have been comparatively rare, probably in no town have men risen more frequently from the humblest to the highest positions by thrift and industry. Among the names most intimately connected with the advancement of various branches of trade are Watt, Boulton, Wedgwood, Murdoch (the inventor of gas), Gillott (the pen-maker), Elkington, Mason, Chance, and Chamberlain. But it is the pride of Birmingham that science and art have

always found a home there, and that literature has never been neglected in the zealous pursuit of business Priestley, Erasmus Darwin, Herschel, Banks, Galton, Solander, and Fothergill are representatives in the scientific sphere. Dr. Johnson was a frequent visitor to the place, and with the cultured social circle that existed, especially at Edgbaston, early in the 19th century, are associated the Edgworths, Dr. Parr, W. Hazlitt, Hutton, and many advanced minds of the 18th century. David Cox, the painter, Wilmore and Pye, the engravers, Rickman, the



Photol TOWN HALL, BIRMINGHAM. [*Pictorial Agency.*

architect, and Baskerville, the printer, were Birmingham men. Music has long been enthusiastically loved there, and the greatest modern composers have produced their works for the first time at the annual festivals. Political feeling for a century has run high in the midland capital. It is one of the few towns in which the local aristocracy of birth and wealth has been on the side of advanced Liberalism, though since the death of John Bright there has been a reaction. The love of religious liberty has here also been conspicuous, and Unitarians, scouted throughout England, have met with respect and encouragement. Birmingham early adopted such organisations for self-help and self-instruction as mechanics' institutes, building and friendly societies, and savings-banks. Standing on high ground, it is a healthy city, and of late years much has been done to beautify its streets and make its sanitation perfect. The town hall is a handsome building in Greek style, and cost £52,000. King Edward's school, a valuable foundation, was rebuilt by Barry on Tudor lines. The University of Birmingham had its charter granted in 1901; the building and equipments of Mason's College are transferred to the University. Mason's College, Queen's College, and the Exchange are good specimens of modern Gothic. The Midland Institute, the corporation buildings, the assize courts, the free libraries, the market hall, and the rooms of the Royal Society of Artists exemplify various forms of classical or Italian schools. Statues of Queen Victoria (erected 1901), Prince Albert, Nelson, Peel, Watt, Priestley, Rowland Hill, and other notabilities adorn the public places, while St. Martin's Church, the Catholic cathedral of St. Chad, and St. Philip's church, are worthy of mention. There are seven parks, the largest being Cannon Hill, and a handsome picture gallery has been erected. Birmingham is the centre of a vast railway system communicating with every part of the kingdom. Most of these lines, being part of the North-Western or Midland Railways, unite under the broad roof of the Central station, but the Great Western has a separate depôt in Snow Hill. The canals, which served for traffic before steam locomotion was introduced, still serve for the conveyance of enormous quantities of goods, and it has even been contemplated to put Birmingham in direct connection by water with the sea. Some of the principal streets are New Street, Corporation Street, High Street, Colmore Row, Paradise Street, and Edmund Street.

Birnam, a village between Perth and Dunkeld in E. Perthshire, Scotland. Duncan's Camp is shown on a neighbouring hill, and it was hence, according to the legend adopted by Shakespeare, that his soldiers marched against Macbeth with boughs in their hands, and so fulfilled the prophecy—"Macbeth shall never vanquished be until Great Birnam Wood to high Dunsinane Hill shall come against him."

Birnee, OLD and NEW, two towns in Central Africa. The former, once the capital of Bornu, is on the river Yeou, 70 miles from Lake Tchad, and covers an area of several square miles, having a large trade. The latter is 20 miles S. of Kuka.

Biron, ARMAND DE GONTAULT, BARON DE, was born in Périgord in 1524, and distinguished himself on the Catholic side in several battles and sieges during the Civil war, but was one of the first to acknowledge Henry IV., fought for him, and was killed at Epernay in 1592.

Biron, CHARLES DE GONTAULT, DUC DE, son of the above, was born in 1562. He served under his father, and was loaded with honours by Henry IV.; but having entered into a conspiracy with Spain and Savoy to depose his master, was executed for treason in 1602. Several other members of the family were distinguished as soldiers or politicians in the two following centuries. [LAUZUN.]

Birrell, RIGHT HON. AUGUSTINE (b. 1850), was educated at Amersham Hall School; graduated at Cambridge in 1872, and became a barrister in 1875. In 1906 he was returned to Parliament for North Bristol; became President of the Board of Education, and had charge of the Education Bill in the House of Commons in 1906. The following year he was made Chief Secretary for Ireland, and carried the Irish Universities Act in 1908. He has written a life of *Charlotte Brontë*, *Obiter Dicta*, and other works.

Birs, or BIRSE, a river which rises in the N. slope of the Jura about 5 miles from Bienne, flows through the Valley de Montier, and, after a course of 50 miles, joins the Rhine close to Basle. On its banks the Swiss suffered a severe defeat from the French in 1444, and in 1499 gained the crushing victory of Dornach over the Austrians. In June, 1891, the

collapse of a bridge over this river caused one of the most disastrous railway accidents that has ever occurred in Switzerland.

Birs Nimrud. [BABEL, BABYLON.]

Bisaglia, or BISAGLIE, a port in the Terra di Barri, Italy, 21 miles N.W. of the capital of the province. The harbour is shallow and does but a coasting trade. There are several churches, a cathedral, the ruins of a pilgrims' hospice used by the Crusaders, and fine reservoirs to store rain-water. Wine and currants are the chief products.

Bisahiagar, a town in the dominions of the Gaekwar of Baroda, Western India, about 220 miles N.W. of the British cantonments at Mhow. A large through trade is carried on, and cotton goods are manufactured.

Bisayas (VISAYAS), one of the great nations of the Philippine Archipelago, ranking in importance next to the Tagals, and occupying nearly all the central islands between Luzon and Mindanao (Samar, Ticao, Masbate, Leyte, Cebu, Bojol, Panay, Negros) and a large part of Mindanao itself. Total population nearly 3,000,000. The Bisayas, *i.e.* "Tattooed" (hence by the Spaniards called *Pintados*, or "Painted"), are an indolent people, mostly agricultural, but cultivating little more than is required for their own wants. The great majority are nominal Roman Catholics, who since their conversion have discontinued the practice of tattooing. Amongst them dwell numerous wild tribes collectively called *Cimarrones*, from the Spanish *cima*, hill-top, whence the English word Maroon. The Bisayas give their name to the province of Bisaya, one of the main administrative divisions of the Philippines. Their language, a member of the Malayo-Polynesian family, is cultivated, and was formerly written in a peculiar character of Indian origin now superseded by the Roman system.

Biscacha. [VISCACHA.]

Biscay, or VIZCAYA, the most northerly of the old Basque Provinces (q.v.), Spain. It occupies a considerable coast-line between Guipuzcoa and Old Castile, and has an area of 833 square miles. The surface is very mountainous, but the valleys, watered by numerous swift streams, produce maize, vegetables, chestnuts, and excellent fruits, whilst sheep and cattle are pastured on the slopes. The coast abounds with fish, which provide a hardy race of seafarers with a good livelihood. Iron, lead, sulphur, alum, and marble are among the valuable mineral products, the chief mining centres being Somorostro and Mandragon. Bilbao is the capital. Portugalete, Durango, and Orduna come next in importance, but are small places.

Biscay, BAY OF (anc. *Sinus Aquitanicus*), the name by which English geographers know the indentation on the W. coast of Europe that extends from Finisterre in France to Cape Ortegal in Spain, and is called by the French *Golfe de Gascogne*. It has a breadth and length of about 400 miles, and its depth varies from 20 fathoms near Ushant to 200 fathoms off the rock-bound coast of Spain. The chief ports are Nantes, La Rochelle, Rochefort, Bordeaux, Bayonne, St. Sebastian, Bilbao and Santander, and the rivers Loire, Charente, Gironde, and Adour drain into it. As a vast mass of water is forced in this funnel-shaped recess by prevailing westerly winds aided by Rennel's current, the waves occasionally run high, and ships are swamped or driven on to a lee shore.

Bischof, KARL GUSTAV, was born at Nuremberg in 1792, and after studying under Hildebrandt at Erlangen, became professor of technology and chemistry at Bonn. He wrote a *Treatise on the Internal Heat of the Globe*, an excellent *Textbook of Chemical and Physical Geology*, and various other works. His investigations into the explosive gases of mines were very highly appreciated. He died in 1870.

Biscuit (*i.e. twice cooked*), a small thin form of bread baked so as to render it hard (at least externally), dry, and durable. For the last 30 or 40 years biscuits have ordinarily been made in large factories, the dough being mixed, kneaded, rolled, and cut by machinery, and then passed through a "travelling oven," during their passage through which they are baked. This trade is peculiarly English and Scottish, and the export of "biscuit and bread" from the United Kingdom is considerable, amounting in value to several hundred thousand pounds per annum, though Germany and the United States also manufacture large quantities. The varieties have greatly increased of late years, and upwards of 300 kinds are commonly sold. *Meat biscuits* contain either extract of meat or dry and pounded meat, or both, mixed with flour and other ingredients; a coarse kind (which also sometimes contains beetroot) is used to feed dogs: *Digestive biscuits* are so prepared as to contain diastase (q.v.), a nitrogenous substance which assists digestion by transforming starch into soluble sugar; *Charcoal biscuits* contain wood charcoal, which is alleged to absorb gases present in the stomach (but its moistened condition there probably prevents this result); while *Diabetic biscuits* contain bran and gluten, but not starchy or saccharine matter. *Ship's bread* or *biscuit*, a mixture of simple flour and water, cut or stamped into regular flat cakes, and so thoroughly dried by baking as to be capable of remaining good for many months or even years. Bread for the Royal Navy was formerly made by hand, and was often very defective. It is now made entirely by machinery; and at the Royal Clarence Victualling Yard, Gosport, facilities exist for turning the unground wheat into biscuit by a continuous process which requires no human intervention. Fine flour and middlings, deprived of bran and pollard, are used. Each sheet of dough of a yard square is stamped hexagon-wise in such manner that it will break up into about 60 biscuits, and each biscuit prepared for the navy bears the King's mark and the number of the oven to which it is to be consigned. The baking process occupies ten minutes. Upon being withdrawn, the sheets are broken up, and the biscuits are packed in sacks. The regular service allowance, when fresh bread is not obtainable, is 1 lb. per man per day.

Bishâri. [BEJA.]

Bishop, a dealers' name for some species of Weaver-birds. The Napoleon Bishop is *Euplectes afer*, the Orange Bishop *E. franciscanus*, the Oryx or Grenadier Bishop *E. oryx*, and the Red Orange Bishop *E. flammiceps*. [WEAVER-BIRD.]

Bishop (Greek *episcopus*, overseer, whence Anglo-Saxon *biscop*), a term originally applied to all who had the oversight of souls, as to apostles (Acts ii. 20), elders, and presbyters (Acts xx. 17; 1 Peter v. 2), and even Christ himself "the Shepherd and Bishop of your souls" (1 Peter ii. 25). In the apostolic age there is no very definite trace of any clear distinction between bishop and presbyter: the persons who approximately correspond to bishops are called evangelists (Acts xxi. 8) [perhaps] angels (Rev. x. 20; 1 Cor. xi. 10), rulers (Heb. xiii. 7), and by other titles. Seemingly, however, after the apostolic age a sort of deputy apostolate was formed with general powers to preach and visit the churches. By the side of these were superintendents of all the churches settled in a certain district, possibly identical with the "angels" of the Apocalypse (though this is much contested) and similar to the "Metropolitans" of later date. Bishops were such superintendents specialised to one church or group of churches, afterwards called a diocese. But the subject has been involved in endless controversy. While the Roman and Eastern Churches and English High Churchmen regard bishops as the successors of the apostles, and invested with the powers conferred on the apostles, the Presbyterian Church and almost all Protestant and non-Episcopal Churches, with many Anglicans, regard the episcopate as a purely human institution, likely to claim sacerdotal and exaggerated powers, and therefore full of danger to the spiritual life of the Church. (The Methodist Episcopal Church [of the United States] has indeed itinerant bishops, but avowedly as a human institution for convenience of superintendence.) The late Dr. Hatch in his Bampton Lectures produced evidence indicating that the title and some of the original functions are derived from the organisation of certain Greek friendly societies, which are known from inscriptions. Apart from mediæval opinion and tradition there is no evidence in the earliest ages of the Church of a distinct "threefold ministry" of bishops, priests, and deacons. The epistles of the New Testament, the *Shepherd* of Hermas, and the *Teaching of the Apostles*, discovered in 1877—the two latter probably the earliest known documents of the post-apostolic age—give no indication of it, and represent a much less definitely organised church and hierarchy than the high Catholic tradition seems to indicate. There is, however, a distinct reference to the episcopate in a form analogous to its present one in the Ignatian epistles of the 2nd century, and it is found established by the time of St. Irenæus (90 A.D.), who, however, calls Polycarp indifferently "bishop" and presbyter. St. Jerome, too, seems to recognise that bishops were not originally distinct from presbyters, and the Council of Ancyra (314 A.D.) allowed presbyters to ordain other presbyters with the bishop's sanction. Originally bishops were chosen by popular election; but the right was gradually engrossed, first by the provincial bishops, then by the cathedral chapter, and eventually by the Pope. Usually on the Continent the Crown now appoints Bishops. In England the Pope appoints Roman Catholic Bishops subject to a recommendation of the Chapter. In Russia the Czar nominates, usually from a list submitted by the Synod. In the Turkish Empire the Sultan confirms the election.

In the Eastern and Roman Catholic Churches the power of the bishop is much as it was in the 3rd century, subject to the rise of patriarchs and metropolitans, and, since the beginning of the nineteenth century, to the various concordats that have limited the power of the Roman Catholic Church in Western Europe. The bishop alone has the power of consecration and ordination. He must visit every part of his diocese once every two years. He has the general superintendence of divine worship, and makes regulations for his diocese subject to the common law of the Church. He can dispense from these, and in some slight degree from the laws of the Church. He decides, in the first instance, all ecclesiastical causes. He consecrates churches, and instruments of worship (*e.g.* chalices). He can suspend the clergy and excommunicate the laity of his diocese, and (except of course where the Church receives a subvention from the State in lieu of endowments, as in France and Italy) he administers the diocesan property subject to the Councils of the Church and the Metropolitan, and in the Roman Catholic Church to the Pope. His title is "Most illustrious and reverend lord." His insignia are pastoral staff, mitre (probably alluded to by Eusebius), ring, pectoral cross, episcopal throne, pontifical vestments, gloves, and sandals.

At the Reformation the Anglican and Scandinavian Churches retained some bishops when they broke with Rome, and the title has therefore been continued in them. The Lutheran Church retained it for a time, and the modern "superintendent" exercises a kind of episcopal function. The "Protestant Episcopal Church of the United States of America" (the American branch of the Anglican Church) had its first bishop, Seabury, consecrated in Scotland in 1784, and its next two, White and Provost (after some little difficulty owing to the rupture with England), at Lambeth Palace. The Scottish Episcopal Church has been a voluntary body since 1688, when all the Scottish bishops joined the Nonjurors (q.v.); the Irish Episcopal Church was disestablished by Mr. Gladstone's Act in 1868.

Recent years have seen an immense development of the Anglican Episcopate. There are now 2 archbishops [ARCHBISHOP] and 35 bishops of English sees, besides 93 colonial, Indian, etc., and 10 missionary bishops. The "Church of England in Ireland" has 2 archbishops and 11 bishops; the Scottish Episcopal Church 7 bishops; the "Protestant Episcopal Church" of the United States 91 bishops altogether, including coadjutor and missionary bishops.

In England the Act 26 Henry VIII. c. 14 provides for the consecration of suffragan or assistant bishops to relieve those bishops of dioceses who are

overworked or infirm. This Act was revived in Queen Victoria's reign; the number of suffragan bishops in addition to the above is now 30. In the American Church it is also the custom to consecrate suffragan or coadjutor bishops, with the prospect, however, of succession to the see. Suffragan bishops in England have no seat in the House of Lords, and are not usually termed "lord bishops."

Of the English sees, Gloucester, Chester, Peterborough, and Oxford were created in 1541; Bristol in 1542; a see of Westminster was created in 1540 but dissolved in 1550; Ripon was created in 1836. New sees have been recently created by voluntary effort: Truro and St. Albans in 1877, Liverpool in 1880, Newcastle in 1882, Southwell in 1883, Wakefield in 1888, Southwark in 1904, Birmingham in 1904. Such creation (by an Act of 1847) is not allowed to increase the number of lords spiritual. The two Archbishops and the Bishops of London, Durham, and Winchester always sit in the House of Lords, and 21 of the remainder are summoned in order of seniority. For the mode of election see CONGE D'ÉLIRE. The dress of an English bishop consists of a rochet, which is practically a surplice without sleeves, over which is worn the chimere of black satin, with the well-known lawn sleeves.

In 1850 a papal bull was issued appointing Roman Catholic archbishops and bishops with territorial titles in England. This caused great alarm, and an Ecclesiastical Titles Act was passed in 1851 by Lord John Russell imposing penalties for the assumption of such titles. But the Act proved a dead letter and was repealed in 1871. Previously the English Roman Catholic bishops had been, according to a usual custom, bishops *in partibus infidelium*, with sees that were purely titular, *e.g.* Chalcedon, Gaza, etc. Thus episcopal functions are exercised in London by a prelate with the title of Bishop of Emmaus.

Bishop, SIR HENRY ROWLEY, born in 1786, was a composer of great merit and reputation. He became "composer in ordinary" to Covent Garden theatre, where he brought out *The Virgin of the Sun, The Miller and his Men, Guy Mannering, The Slave, Maid Marian,* and *Clari,* introducing the well-known song *Home, Sweet Home.* He also undertook to improve Mozart and Rossini for the English stage. In 1824 he went to Drury Lane. His *Aladdin,* intended to eclipse Weber's *Oberon,* proved a dismal failure, and with *The Fortunate Isles* given at Covent Garden in honour of the Queen's wedding in 1840 his operatic efforts came to an end. He was a director of the Philharmonic concerts, received knighthood in 1842, and in 1848 succeeded Crotch in the chair of music at Oxford. He died a poor man in 1855. Bishop takes high rank along with Purcell, Arne, and other representatives of the English school as a tuneful writer of songs and glees, among which it suffices to mention *Bid me discourse, Should he upbraid, My pretty Jane, Mynheer Van Dunck, The wind whistles cold, The Chough and the Crow.*

Bishop-Auckland, a market-town in the county of Durham, situated at the confluence of the Wear and the Gannlees, 11 miles S.W. of the city of Durham, with a station on the North-Eastern Railway. It derives its name from the palatial residence of the bishops of Durham, established here in Edward I.'s reign. The modern town hall has a tower 100 feet in height, the streets are well-built and clean, and there are churches, chapels, and the usual public buildings. The manufacture of cotton goods and machinery employs most of the population, but there are large coal-mines in the neighbourhood. Pop. (1901), 11,966.

Biskra, or BISKARA, a town and military post in the province of Constantine, Algeria, standing on the S. slope of the Aures Mountains, in a fertile valley watered by the Wady Biskra. It is an important depôt for the caravan trade with the interior, has mines of iron and quarries of limestone and saltpetre, and is famous for its dates and carpets.

Bisley, a village in Surrey, the site of the annual meeting of the National Rifle Association after its removal from Wimbledon, where the competitions formerly took place.

Bismarck, OTTO EDWARD LEOPOLD, PRINCE VON, belonged to an old and distinguished Prussian family settled in Pomerania and Brandenburg, and was born at Schönhausen in 1815. From 1835 to 1839 he held subordinate positions in the Civil Service. In 1847 he married Julia von Puttkamer, and entered the Prussian Landtag. He adopted Conservative views, which were strengthened by the events of 1848, and in 1849, as a member of the new Parliament, he stood forward as one of the most powerful opponents of revolutionary ideas, and in 1851 he became the recognised leader of his party. Bismarck's programme, framed at this period, has been carried out with but little variation in detail until the present day. His aim was to sever the north German States from any dependence on Austria or any interference from foreign powers, and to weld them into a free, united nation with Prussia at its head. Thinking lightly of constitutions, parliaments, and other contrivances for stifling action in talk, he wished the central power to be in the hands of a monarch, wise, vigorous, patriotic, such as the house of the Hohenzollern could supply. His policy must be supported both at home and abroad by sufficient military strength; must aim at perfect justice and complete administrative efficiency; and must create and appeal to a popular sense of religion, loyalty, and military discipline. From 1851 to 1862 Bismarck was employed as envoy or ambassador at the Frankfort Diet, St. Petersburg, Vienna, and Paris, acquiring valuable experience. At last William I. summoned him home to act as minister, president, and chief adviser of the Crown at a moment when a Liberal majority in the Landtag and the schemes of France and Austria threatened to postpone indefinitely the realisation of his hopes. His arbitrary methods made him unpopular at first, but his successful conduct of the Danish war and the consequent annexation of Schleswig-Holstein soon restored public confidence. A struggle with Austria then became imminent, and all Bismarck's skill was exerted to prevent Napoleon III. from

taking part in the fray. At this moment (May, 1866) he narrowly escaped death at the hands of a fanatical assassin, Lionel Cohen. Then followed the Seven Weeks' war, which saw Austria so speedily humbled at Königgrätz. The statesman rode by the king's side over the field of battle, and completed the work of the needle-gun by skilfully negotiating the treaty of Prague. The Bund was broken up, and in its place stood the North German Confederation with Prussia at its head, Hanover, Schleswig-Holstein, Hesse, and part of Saxony being added to the Prussian kingdom. In 1867 Bismarck, now the idol of his nation, became chancellor of the Confederation. Napoleon III., bitterly disappointed at the issue of the war of 1866, sought various opportunities for beginning the strife on such terms as would secure the alliance of Austria and the South German States, if not of other powers. Bismarck adroitly contrived to make a deliberate insult to his sovereign the *casus belli* rather than the alleged candidature of Prince Leopold of Hohenzollern for the Spanish throne, and at the same time he published a proposal from France by which Belgium was to become French territory. War was declared on July 19th, 1870, and Bismarck with the king was present at many of the battles, and on September 2 received in person the surrender of Napoleon, with whom he arranged for the capitulation of Sedan. In October he took up his quarters at Versailles, and it was there on January 18, 1871, that he saw the dream of his life fulfilled, when William I. was proclaimed Emperor of Germany by the assembled princes of the Confederated States. He himself received the appointment of Chancellor of the Empire, and in that capacity a few days later arranged the terms of peace with France. For twenty years the "honest broker" was now supreme at Berlin, and it might almost be said throughout Europe. At home he skilfully took advantage of the divisions of parties in the Reichstag to free himself practically from parliamentary control. Abroad he strove earnestly for peace, and attained his ends by playing off one power against another with cynical dexterity. He must be credited with having circumscribed the Russo-Turkish quarrel of 1877, and with having patched up the peace of Berlin. He drew himself closer to Austria in 1879 as a hint to Russia, and presently showed signs of cordiality to the Czar. He sided apparently with France in deprecating the British occupation of Egypt, and in various ways tried to lull into quiescence the keen spirit of revenge. In 1884 he began to take great interest in German colonisation, and this new departure brought him into collision with England as regards Africa and with Spain in the matter of the Caroline Isles. The dangers arising from this source were happily smoothed down, for a time at least, by diplomacy. In 1885 his seventieth birthday was kept with universal rejoicing, and in 1887 the twenty-fifth anniversary of his accession to power was celebrated with equal fervour. In this latter year the unsettled state of France during the Boulanger episode and the open sympathy shown by Russia to French *Chauvinistes* led Bismarck to seek alliance with Italy, and negotiations with Sig. Crispi resulted in an understanding which has never been fully disclosed, but it was followed by a large increase in the German army. The death in 1888 of his old master, William I., led to no immediate diminution of the chancellor's influence, though it was expected that the well-known Liberal sympathies of the new kaiser's wife would ruffle the relations between the court and the minister. These anticipations were multiplied by the hopeless illness and speedy decease of Frederick; but in the person of his son and successor rose up a fresh source of danger. William II., a young and vigorous man, had learned only too well Bismarck's own doctrine of absolutism, and he resolved from the first to be the real head of the state. In March, 1890, an open rupture occurred on the question as to whether the sovereign should communicate with his ministers directly or through the intermediary of the chancellor. Bismarck resigned, and his resignation was accepted in a way that was humiliating to himself, whilst his own conduct was not wholly free from insolence and want of patriotism. His fall provoked no storm in the empire, and for some months he retired into private life. His discontent with the new order of things was chiefly expressed, for some time after his fall, in unsigned articles in a Hamburg and Munich paper. In 1894 a reconciliation was effected between Bismarck and the Kaiser. On July 30th, 1898, he died; his *Memoirs* were issued almost immediately after his death.

Bismuth, a grey metal found native in Saxony, and as oxide (Bismuth ochre) and sulphide (Bismuth glance). It occurs in Cornwall as sulphide, associated with sulphides of lead and copper. The metal is obtained from its ores by roasting, and afterwards melting with charcoal and a little iron, under a layer of slag. The metal so obtained is slowly melted, and the bismuth, which fuses easily, is run off, and finally purified by melting with a little nitre. It is a very brittle and crystalline metal, fuses at 264°. It has at. wt. 210; sp. gr. 9·93. Its symbol is Bi. It is used as a constituent of many alloys. Fusible metal is composed of two parts bismuth, one part lead, and one part tin. This alloy melts at 96°, and has the property, like bismuth itself, of expanding on solidifying. It forms two oxides, BiO_3 and BiO_5, and forms salts with different mineral acids. It shows close relationship to antimony (q.v.) in most of its properties. The subnitrate and carbonate of bismuth are both used in medicine; being heavy insoluble powders they are usually "suspended" in mucilage when given in mixture form. There is also a soluble preparation, the Liquor Bismuthi et Ammoniæ Citratis; and the subnitrate may be administered in the dry state in the form of lozenges, Trochisci Bismuthi. The subnitrate is one of the most valuable drugs in the pharmacopœia; in certain cases of vomiting and of diarrhœa the greatest benefit results from its use. The bismuth salts are also sometimes applied externally to sores and leigematous patches, and as a snuff in nasal catarrh.

Bison, the popular name for two species of wild cattle (*Bos europæus* and *B. americanus*), sometimes made a distinct genus (Bison) of Bovidæ (q.v.). These animals differ chiefly from the common ox and other members of the genus Bos in the greater

breadth and convexity of the frontal bones, in their longer limbs, in the presence of an additional pair of ribs (there being fourteen pairs in the bison and only thirteen in the ox), and in the much greater development of the spinal processes of the dorsal vertebræ, which serve as points of attachment for the muscles that support the head, and with them form the hump so characteristic of these animals. The orbits are tubular, and the curved round horn-cores are placed considerably below the level of the occiput. The European Bison (*B. europæus*) has been known from classic times. There is very little doubt that it is the *bonassos* of Aristotle, and the *bisōn* of Oppian ; it is mentioned by Pliny (lib. viii. c. 15), and contrasted with the urus (*B. primigenius*), with which it is often confounded, and the same contrast is made by Martial (*Lib. Spec.* 23) in his epigram on the hunter Carpophorus, who was also a professional fighter with wild beasts in the arena. According to this author (i. 105) the European Bison was trained to draw chariots in the Roman spectacles. This species was formerly abundant over the central and eastern parts of Europe, but is now restricted to the Caucasus, and to the forest of Bialowicza in Lithuania, where it is protected by the Emperor of Russia. It is the larger of the two species, and the largest living European quadruped, standing about six feet at the shoulders and measuring some ten feet from the muzzle to the root of the tail, which is nearly three feet in length ; and the strength of the huge beast is proportional to its size. The general colour is dusky brown ; the hair on the forehead is long and wavy, and there is a kind of beard on the chin and breast. In winter the neck, hump, and withers are clothed with dark brown hair, with an undergrowth of soft fur ; the former is shed in the summer, and renewed in the following winter. The cows are smaller than the bulls, and their manes and beards are not so thick and long ; they carry their young (which do not attain maturity till their sixth year) for nine months, the same period as the domestic cow, and the duration of life has been put at from thirty to forty years. Like the ox the bison grazes, but feeds also on brushwood, and the bark and shoots of young trees, especially of the ash, birch, poplar, and willow. It is extremely shy, and as its sense of smell is very acute, the hunter can only approach it from the lee side ; and when provoked it is very formidable. It runs with great speed, but has little staying power, and holds its head very low so that the hoofs are raised above it in galloping. This form is represented by a variety (*v. priscus*) in the Pleistocene of Europe and Arctic America.

The American Bison (*B. americanus*) is somewhat smaller than *B. europæus*, but with a much larger chest, a smaller and weaker pelvis, a shorter and smaller tail, shorter horns, more shaggy head, and heavier beard. It formerly ranged in vast herds over North America, between the Great Slave Lake and the Mexican frontier, "forming the chief means of subsistence to tribes of Indians equally doomed to speedy extinction ;" now as a wild animal it has practically vanished, and only a few herds remain, in a more or less protected condition. In 1886, when the authorities at the Smithsonian Institute wished to procure specimens for stuffing and mounting, their agents, after diligent search, were only able to bring back twenty-five. The flesh of old bulls was tough and hard, but that of young fat cows made excellent beef, and was dried or made into pemmican for future use, while the tongue and hump were reckoned special delicacies, and the fat was rendered into tallow. The skins were dressed for robes or tanned for buff leather, the coarse wool was made into cloth, and the droppings—known as "buffalo-chips" or *bois-de-rache*—were utilised as fuel. No serious attempt has ever been made to domesticate this species, but Mr. Allen (to whose monograph all recent writers are indebted) thinks that the experiment "would eventually yield a satisfactory and probably a profitable result, with the possibility of adding another valuable domestic animal to those we already possess. It is probable that a mixed race might be reared with advantage." *B. latifrons*, from the Pleistocene of Texas, is generally considered to have been the ancestor of this form. As the European species is misnamed the Aurochs, this animal is often wrongly called a "buffalo"—the particular bovine to which it is least related, and which it least resembles. In India the name "bison" is commonly applied by the English to the Gaur (q.v.).

Bissagos, or BIJUGA ISLANDS, a volcanic group off the W. coast of Africa, between the Gambia and Sierra Leone. The larger islets are about twenty in number, but there are many smaller ones. The French and British formerly had stations there, but they are now in the hands of the Portuguese, and still serve as a depôt for slaves. Bissao is the seat of the Portuguese settlement. There is a large negro population, and the products are maize, rice, wax, palm-oil, and hides.

Bissen, WILHEM, born near Slesvig in 1798, studied sculpture in Rome under Thorwaldsen, and returned to Denmark, where he produced some fine works. In 1841 he was again in Rome, having received a commission from the Danish Government. A few years later he carved the Greek frieze that adorns the great hall of the palace at Copenhagen, where in 1850 he became director of the Academy of Arts. Thorwaldsen left to him at his decease the completion of his unfinished statue. His best-known works are *Cupid sharpening his Arrow*, and *Atalanta hunting*. He died in 1868.

Bistort (*Polygonum Bistorta*), a pretty British plant often grown in gardens, named snake-weed, snake-root, or bistort (twice twisted), from its twisted root-stock. It has stems 12 to 18 inches high, each bearing a spike about two inches long of small flesh-pink flowers. Its starchy astringent roots have been used both as food and as medicine.

Bit, the part of a bridle (q.v.) which is inserted in the horse's mouth, together with the rings to which are fastened the reins and check-straps. It is made of metal. There are very many varieties of bits. [BRIDLE.]

Bitche, or BITZCHE (anc. *Bidiscum* or *Bicina*), a fortified town in German Lorraine, formerly in the department of Moselle, France, and to the N. of

the Vosges Mountains. It was formerly named Kattenhausen, and was taken by France as part of the Duchy of Lorraine in 1738, and restored to Germany in 1871. The position is a strong one, and resisted the attack of Austria in 1793 and Russia in 1797, and stood a long blockade in 1870–71. The chief industries are the manufacture of watch-glasses and matches, but there are ironworks and potteries.

Bithur, a town in the North-West Provinces of India, on the right bank of the Ganges, 12 miles above Cawnpore. It was assigned as a residence to the last Peishwa, Baji Rao, on his surrender to the British, and there his treacherous son by adoption, Nana Sahib (q.v.), lived in great state, and, hatched the conspiracy that took shape in the mutiny of 1857. Havelock drove him out of the place, which is now a sacred bathing-place for Hindu pilgrims.

Bithynia is the name by which the country that occupies the N.W. corner of Asia Minor was known to antiquity. It is said to have been called Bebricia in remote times until colonised by the Bithyni, a Thracian tribe. Though nominally subject in succession to Assyria, Lydia, Persia, and Macedonia, the native chiefs appear to have enjoyed considerable independence, and Nicomedes I. (278–250 B.C.), the founder of Nicomedia (Ismid), established a dynasty which struggled for some years against the rival kingdom of Pontus, and ultimately surrendered its territory to Rome (74 B.C.). Pliny the Younger was proconsul in 103 A.D. Prusias I., one of these sovereigns, sheltered Hannibal, and gave his name to the city of Broussa, destined to be the capital of the Ottoman Turks before the capture of Constantinople. Bithynia as a Roman province was bounded E. by the Parthenius (Bartan) river, and S.W. by the Rhyndæus, having an extensive coast-line on the Euxine and the Propontis, where the Greek colonies of Chalcedon, and Heraclea Pontica (Erekli) were early established. Nicæa, which played so important a part in Church history, was then the rival of Nicomedia. The whole tract is intersected by offshoots of the Mysian Olympus (6,400 ft.) and the Ala Dagh range, but the valleys are exceedingly fertile. Towards the Bosphorus the ground is hilly rather than mountainous, and is densely wooded with valuable timber. The Sangarius (Sakaria) is the chief river, but there are many small and rapid streams. At the fall of the empire, the Oghusian Tartars held the province (1231 A.D.) for a time, but it finally passed into the hands of the Turks in 1327.

Bitlis, a town in the pashalic of Van, Asiatic Turkey, 62 miles W. of the city of Van. It stands in a ravine 5,000 ft. above the level of the sea, and 2,000 ft. above the valley below, and has mosques, baths, convents of howling dervishes, and caravanserais for an extensive through trade. Red cotton cloths, arms, silver-ware, and tobacco are the staple products. In 1554 Solyman the Magnificent was defeated by the Persians in the vicinity.

Bitonto (anc. *Butuntum*), a fortified city in the province of Terra di Bari, Italy. It is the seat of a bishopric, has a fine cathedral, an ancient castle, and a considerable trade in olive oil and Zagarelle wine. Though an old town, it cannot be traced in classical times, and became known in the Middle Ages for its *Accademia degl'Infiammati*. A pyramid marks the scene of the defeat of the Austrians in 1735 by the Spaniards, under Mortemar.

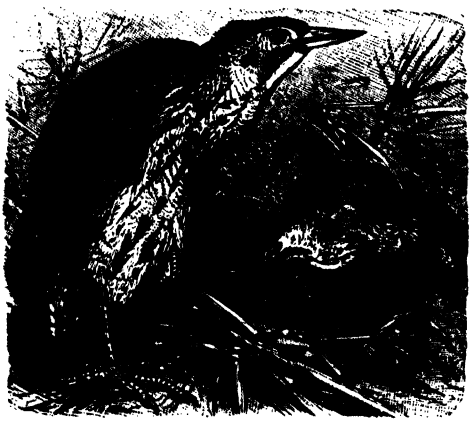
Bits, or BITTS, a frame composed of two strong upright pieces of timber with cross braces fixed in the fore part of a ship's deck, and to which the cables are fastened when the vessel rides at anchor. In modern ships and especially in ships of considerable size, the bits are of iron. Smaller bits, constructed in nearly the same manner, are used for fastening topsail-sheets, etc., on deck and stand at the foot of the masts.

Bitter Almond Oil, a volatile oil obtained from bitter almonds, consisting of benzaldehyde C_6H_5COH, also called benzoyl hydride. (*See* BENZENE.) It does not occur as such in bitter almonds, but is produced by the fermentation of *amygdalin*, caused by a substance, *emulsin*, both of which are contained in the fruit. The fermentation of the amygdalin is represented by the equation: $C_{20}H_{27}NO_{11} + 2OH_2 = C_6H_5COH + HCN + 2C_6H_{12}O_6$, prussic acid, and grape sugar being also produced. It is also obtained from the stones of peaches, and from laurel, cherry, and peach leaves. To obtain it from bitter almonds, or any of these sources, they are ground, pressed, made into a cream with water, allowed to stand for one day, and the liquid then distilled by passing superheated steam through it. The crude oil so obtained contains prussic acid, from which it is freed by fractional distillation or by shaking with milk of lime, and ferrous sulphate, and again distilling. It is a colourless liquid with an aromatic odour, boils at 179°. Is miscible with alcohol and ether, and slightly soluble in water. It has the general properties of Aldehydes (q.v.).

Bittern, the liquor left after the partial evaporation of sea water, and crystallisation of a great portion of the common salt. It contains, besides common salt, sulphate, chloride, and bromide of magnesium, and is chiefly used as a source of Bromine.

Bittern, any bird of the genus Botaurus, of the heron family (*Ardeidæ*), with six species, spread nearly over the globe. The bitterns differ from the true herons in having much longer toes and shorter legs and neck, the latter clothed in front and on the sides with long, loose, erectile feathers, and nearly bare or downy at the back. They are generally solitary birds, haunting wooded swamps or reedy marshes, lying close by day, and coming out at dusk to feed on fish and other aquatic animals, mice, and small birds. The common bittern (*Botaurus stellaris*) is from 28 in. to 30 in. long; general plumage rich brownish buff, with irregular streaks and spots of black, dark brown, grey, and chestnut; under-surface buff, streaked with brown, beak greenish-yellow, legs and feet green. This bird affords a good example of protective coloration.

There is an instance on record of a sportsman who, having shot a bittern, was unable to discover it for some time, though his dog made a dead point at it, so closely did the plumage harmonise with the dry, coarse grass in which the wounded bird lay. This species was formerly fairly common in the fen lands of England, but the reduction of these tracts to cultivation has driven it away, and the last recorded



BITTERN (*Botaurus stellaris*).

instance of its breeding in this country was at Upton Broad, Norfolk, in 1868. It was highly prized by falconers for the sport it afforded, though when attacked or wounded it is dangerous to approach it, for it throws itself on its back and fights vigorously with its claws and spear-like bill. Its flesh was eaten, and was esteemed superior to that of the heron. The nest of the bittern is a mere collection of sticks and rushes; the eggs are greenish-brown in colour, and four or five in number. The booming cry of this bird, which is especially loud and prolonged during the breeding season, has given rise to a number of expressive folk-names—Butter-bump, Bull-of-the-Bog, Mire-drum—and has been noted in English literature from Chaucer to Tennyson. Early naturalists thought it was produced by the bird putting its bill into a reed or into mud and water, and "after awhile retaining the air suddenly excluding it again." Sir Thomas Brown was the first to show that this was not the case, "for some have beheld them making this noise . . . far enough removed from reed or water." The American bittern (*B. lentiginosus*), an accidental visitor, may be readily distinguished from the European form by its smaller size, more slender legs and feet, and the uniform leaden hue of the primaries, which in the last-named bird are broadly barred with buff. The Australian bittern (*B. poiciloptilus*) closely resembles the European bittern in habits; the upper surface is purplish-brown, except the wings, which are buff marked with brown, throat and under surface deep tawny buff mottled with brown. The Little Bittern (*Ardetta minata*), an occasional summer visitor, forms a connecting link between the bitterns and the herons. It is not more than 13 in. long; general plumage shades of buff, with the top of the head, shoulders, primaries, and tail feathers shining greenish-black.

Bitters, the name given to a compound prepared from an infusion of bitter or aromatic herbs in spirits of wine. *Hop bitters* is the most common variety, and is highly thought of by some, as an aid to digestion and a mild tonic. It is to the hop that beer owes its efficacy as a tonic. Other herbs frequently used are the gentian, wormwood, cascarilla, and quassia.

Bittersweet, a literal translation of the specific name of *Solanum Dulcamara*, the woody nightshade, a common British plant clambering in hedgerows or by the waterside. It has drooping clusters of small bright purple flowers, resembling in miniature those of its congener the potato, which are succeeded by oval fruits becoming scarlet. Its young stems have been used medicinally, and have a taste at first bitter but afterwards sweet. It is often popularly confused with the deadly nightshade (*Atropa Belladonna*), an allied plant very different in appearance.

Bitumen is a general term for a number of natural inflammable pitchy or oily substances, consisting of hydrocarbons, generally to some extent oxygenated, and sometimes containing a little nitrogen. The liquid forms are called *naphtha* when thin and light-coloured, *petroleum* when less fluid and dark yellow or blackish brown, and *maltha* when very viscid. The solid forms are known under the general name *asphalt* (q.v.). They apparently originate, at least in some cases, from the natural distillation of organic matter, the petroleum of Pennsylvania coming from Old Red Sandstone or Silurian rocks, the most limpid and volatile oils from the deepest borings. The asphalt of Trinidad is derived from lignite beds in underlying clay. As colourless naphtha (CH_2) flows from the ground it partly evaporates, takes up oxygen and becomes brown and thick petroleum, or ultimately solid glassy asphalt. Related minerals are *elaterite*, elastic bitumen or mineral caoutchouc; *albertite*, a brittle black asphalt; *ozokerite*, a native paraffin (CH); *hatchettine*, or mineral tallow; and *torbanite*, or boghead coal. Solid paraffin and other pure hydrocarbons are obtainable from all these substances by fractional distillation. Solid bitumen was used by Niepce in his photographic printing process, which depended on the fact that after long exposure to light the bitumen became insoluble in its ordinary solvents, as oil of lavender.

Bitzius, ALBERT, born at Morat, Switzerland, in 1797, and passed an uneventful life as a Protestant pastor. Under the *nom-de-plume* of Jeremias Gotthelf he wrote a number of tales that became very popular and spread wholesome lessons of piety and morality among the Swiss, in whose dialect they were written. He also collected national legends. His works were translated into German and thus got a wider circulation. He died in 1854.

Bivalve, a term applied to those animals in which the shell consists of two separate halves or valves. Such are the LAMELLIBRANCHIATA, in which the two valves may be equal, as in the cockle, or unequal, as the oyster; the BRACHIOPODA, in which the valves are always unequal though each valve may be bilaterally symmetrical. Among the crustacea there are the OSTRACODA and some PHYLLOPODA.

Bivouac (a corruption of the German *beiwache*), in military language, the encampment in the open air of a body of soldiers without tents. Each man remains dressed and has his weapons by him ready for a sudden attack.

Bizerta, a seaport of Tunis, Africa, 38 miles from the capital, and occupying the site of the ancient Tyrian colony Hippo Zaritus. It stands on a lagoon which communicates with the fresh water lake of Gebel Ishkel. The Turks, as usual, have allowed the excellent harbour to become choked up, and trade, still considerable, can only be carried on now by small vessels. Fishing, and the preparation of *Botarge* from the roe of the mullet, are the only industries.

Bizet, GEORGES, was born at Paris in 1838, and received a musical education at the Conservatoire under Halévy and in Italy. He came out first as an operatic composer with *Les Pêcheurs de Perles*, in 1863. In this, and in the *Jolie Fille de Perth* (1867), he showed that Wagner's influence had extended into France. A little later he furnished the music for Daudet's *L'Arlésienne*, which was very popular with his own countrymen. By far his most brilliant and original work is *Carmen*, produced in 1875. The work gave every reason to hope that greater things were in store, when the gifted author died suddenly from heart disease within a few weeks of the appearance of his piece.

Bjela, or BIELA, a town in the government of Siedlce, Russian Poland, on the river Krzna. There is a large trade in corn, and the Radziwill family have a palace here.

Björnson, BJÖRNSTJERNE (1832–1910), born at Quickne, in Norway, where his father was pastor. He completed his education at the universities of Christiania and Copenhagen, and his first literary attempt was *Kalborg*, a drama which he did not allow to appear. In 1857 he made his initial success in another line with an idyllic peasant romance, *Synnöve Solbakken*. Ole Bull made him manager of the Bergen theatre, and in 1858 he put on the stage *Halte Hulda* and *Mellem Slagene* (*Between the Battles*), besides writing his most popular story *Arne*. He then became a newspaper editor, but his religious views led to his leaving Norway, and for nearly twenty years he lived chiefly abroad. From 1876 to 1883 he settled near Lillehammer, and as leader of the "Peasants' Party" had some influence in politics. His home was in Paris. His best play was *Sigurd the Bastard;* he was a lyric poet of high order, and even tried his hand at epic verse. It is impossible to give a list of his many novels and tales. In all his works he aimed at expressing the national spirit and discountenanced imitation of the French. He undoubtedly stimulated the revival of Scandinavian literature.

Björnstjerna, MAGNUS, Count, born in 1779 in Sweden; was employed in negotiations with Napoleon in 1809, and fought at Leipsic in 1813. He concluded the treaty which united Sweden and Norway in 1814, and from 1828 to 1846 was Swedish Ambassador in London. He died in 1847. Among other works he wrote an account of the Hindu theogony.

Black signifies the entire absence of colour-sensation. An object appears black when no appreciable amount of light comes from it to the eye of the observer. This may be because (1) the object emits no light and no other source is available, as for instance, objects in a dark room which are then all black; (2) it absorbs all the light which falls on it without reflecting any back, like lampblack in the daylight; or (3) the light reflected is not reflected to the eye of the observer. Thus blackness is not an intrinsic property of the substance. But none of these conditions are ever perfectly satisfied; thus lampblack does not absorb absolutely all the light received upon it. [COLOUR, REFLECTION.]

Black, ADAM, publisher, was born in 1784 in Edinburgh, apprenticed as a bookseller for five years, and after serving two years as an assistant in London, started for himself in 1808 in Edinburgh, where with his nephew he founded the house of Adam and Charles Black. In 1827, after Constable's failure, the Blacks purchased the copyright of the *Encyclopædia Britannica*, and in 1851 the copyright of Sir Walter Scott's novels—two ventures that brought fame and fortune to the firm. Adam Black took a keen interest in local and general politics, and after serving twice as Lord Provost in his native city, represented it in Parliament from 1856 to 1865 in the Liberal interest. His death occurred January 24, 1874.

Black, JOHN, journalist, was born in 1783 near Dunse, Berwickshire. After acting as a clerk in Dunse and in Edinburgh, he removed in 1810 to London, and was appointed parliamentary reporter for the *Morning Chronicle*, of which he became practically the editor in 1817. He was greatly assisted in this position by the advice and inspiration of the Mills, and under him Charles Dickens began his newspaper career. In 1835 he fought a duel with John Arthur Roebuck, who had published a pamphlet accusing him of cowardice. His editorship ended in 1843, when his friends, he having saved no money, bought him an annuity of £150 a year. Besides some translations from Italian, French, and German authors, Black also wrote a *Life of Tasso*. He died June 15, 1855.

Black, JOSEPH, chemist, was born in 1728 at Bordeaux of Scottish parentage. He studied in Belfast, Glasgow, and Edinburgh, where his celebrated graduation thesis, *De humore acido a cibis orto, et magnesia alba*, was presented to the medical faculty June 11, 1754—a thesis that revolutionised chemistry and paved the way for Cavendish,

Lavoisier, and Priestley. After this came his discovery of latent heat (q.v.), of which, however, he failed to publish a detailed account. In 1756 he had been appointed to the chair of anatomy and chemistry in Glasgow university, but exchanged duties with the professor of medicine on account of the anatomy, which he felt he was not sufficiently qualified to teach. In 1766 he received the appointment to the chair of medicine and chemistry in Edinburgh, where he chiefly devoted himself to his professional duties and made his class the most popular in the university. Though M. Deluc, a Frenchman, in 1788 claimed to be the author of the theory of latent heat, yet it is upon this discovery that Black's fame chiefly rests. He died in 1799.

Black, WILLIAM, novelist, was born in 1841 in Glasgow. Taking up journalism as a profession, he in 1866 acted as war-correspondent for the *Morning Star* in the Austro-Prussian war. After this he became editor of the *London Review* and assistant editor of the *Daily News*, which position he resigned in 1875. His first hit as a novel-writer was made by *A Daughter of Heth*, published in 1871, his previous efforts having failed to attract very wide attention. *The Strange Adventures of a Phaeton* (1872) and *A Princess of Thule* (1873) are among his best known works. He died in December, 1898.

Black Art, magic, especially the power of exorcising evil spirits. The term "black" was applied because proficients in the art were supposed to be in league with the powers of darkness.

Black Assize, the name given to an assize which was held at Oxford in 1557. The High Sheriff and 300 others caught an infectious disease from the prisoners, and all perished.

Black Baboon (*Cynocephalus niger*), a small aberrant form from Celebes and some of the neighbouring islands, where it was probably introduced by man. The general form of the skull agrees best with that of the mandrill, while the position of the nostrils brings it nearer to the macaques. It is frequently seen in captivity, but nothing is known of its habits in a wild state.

Blackband, an iron ore consisting mainly of ferrous carbonate. Bituminous matter is also always present, frequently in such amount as to render the use of charcoal in calcination unnecessary.

Black Bear (*Ursus americanus*), a North American bear, differing from the brown bear (q.v.) of Europe in the colour of its fur, more rounded skull, and smaller size, rarely exceeding five feet in length. It is practically vegetarian in diet, and rather timid, rarely attacking man unless it is wounded and brought to bay, or in defence of its young. The fur is used for rugs, trimmings, etc., and for bearskin caps, holsters, and other military accoutrements. The name is also applied to *U. tibetanus*, the Himalayan Bear, or Indian Black Bear, about the size of the American form, but with a white chin, a collar of long hair, and a broad Y-shaped mark on the breast.

Black Beer, a kind of beer largely made in Dantzic in Prussia.

Blackberry, the fruit of the brambles, species formerly united under the name *Rubus fruticosus*. It is known technically as an etærio of drupels, consisting of a number of distinct (apocarpous) carpels, each of which is a drupel or miniature drupe, with polished skin or epicarp, fleshy mesocarp, and stone (endocarp), containing one seed, but differing from a plum in having a persistent style. The calyx and stamens also persist in the fruit stage. Blackberries are largely collected in England for puddings, jam, and jelly. [BRAMBLE.]

Blackbird (*Turdus merula*), one of the best known British song-birds, breeding in every county, occurring also nearly all over Europe (in some parts, however, only as a winter visitant), and in the north of Africa and the Azores. The adult male is about ten inches long, plumage glossy black, under-surface of wings greyish-black, bill and edges of eyelids gamboge-yellow; in the female the upper plumage is umber-brown, with some darker spots, belly, sides, and lower tail-coverts hair-brown, bill dusky brown. In very old birds the feathers of the hind-neck are tipped with fine hairs. Albino, pied, and cream-coloured specimens are met with from time to time. Blackbirds pair early in spring, and often rear two broods—a fact noted by Aristotle. The nest is formed of small sticks and root-fibres, plastered inside with mud and lined with soft dry grass, and is generally built in a thickset hedge or close bush or tree. The eggs are four or five in number, bluish-green with brownish markings; and the male assists his mate in feeding the brood. The food of the blackbird is very varied in character; in summer it commits great depredations in fields and gardens, making some amends, however, by the number of snails, slugs, and beetles which it consumes in the winter. Its natural song is loud and clear; it can be taught simple airs and to articulate short sentences. In Old and Middle English the blackbird was often called the Merle, a name now confined to provincial English or archaic literature. In America the name is loosely used for many birds of sable plumage. [RING-OUZEL, SAVANNAH BLACKBIRD, THRUSH.]

Black Book, the name given to the collection of the reports furnished by the emissaries of Henry VIII. in 1536, who had been sent to discover grounds for the suppression of the monasteries.

Blackburn, a town of Lancashire, England, and the leading centre of the cotton industry, is situated on a branch of the Ribble, called in Domesday Book "Blackeburn." It was incorporated as a municipality in 1851, though as far back as the 16th century it had acquired importance as a market town. Amongst prominent names in the history of the cotton manufacture, associated with Blackburn, are those of Peel, and Hargreaves, the inventor of the spinning jenny. Its educational institutions comprise a grammar school, established by Queen Elizabeth in 1567, and a technical college; and among its notable buildings are the very

ancient church of St. Mary's, the town hall, and exchange. Other amenities are its parks—the Corporation Park, of 50 acres, and the Queen's Park, of 35 acres. Pop. (1901), 127,527.

Blackburne, FRANCIS, Lord Chancellor of Ireland, was born in 1782 at Great Footstown, County Meath. He entered Trinity College, Dublin, in 1798, kept his terms at King's Inn, and thereafter proceeded to Lincoln's Inn, London. In 1805 he was called to the bar, and in 1822 administered the Insurrection Act in the city and county of Limerick. In 1830 he became attorney-general for Ireland, under Earl Grey, and again in 1841 under Sir Robert Peel, succeeding Sir Michael O'Loghlen as Master of the Rolls in Ireland in the following year. His subsequent appointments were in 1846 to the chief-justiceship of Queen's Bench, in 1852 and 1866 to the Lord-Chancellorship by Lord Derby, and in 1856 Lord Justice of Appeal by Lord Palmerston. He was for several years vice-chancellor of Dublin University, and in 1867, the year of his death, he declined the offer of a baronetcy by Lord Derby.

Blackcap, or BLACKCAP WARBLER (*Sylvia atricapilla*), a migratory bird, resident in the warmer parts of Europe, arriving in Britain about the middle of April and leaving in September, stragglers occurring sometimes during the winter. The adult male is nearly six inches long, has the top of the head black, neck ash-grey, rest of upper surface greenish-grey, tail barred with a darker shade, under surface ash-grey. The female is somewhat larger, and has the top of the head reddish-brown, and the rest of the plumage more tinged with brown than the male. These birds feed on insects, berries, and fruit, especially red currants and raspberries; and the male takes part in the task of incubation. The song of the blackcap is sweet, loud, and wild, according to Gilbert White, superior perhaps to any of our warblers, the nightingale excepted. [CHICKADEE.]

Black Cap, the cap of black colour worn by an English judge when he is about to pass sentence of death on a criminal.

Blackcock, BLACK GAME, BLACK GROUSE, or HEATH FOWL (*Tetrao tetrix*), a British game bird of the same genus as the grouse (q.v.). The adult male is about 22 inches in length, and weighs from 4 lbs. to 4½ lbs.; general plumage bluish-black, secondaries tipped with white, and forming with the neighbouring coverts a band across each wing, under tail-coverts white; legs furnished with dark brown hair-like feathers speckled with white, toes pectinated; the outer tail feathers are much longer than those in the middle, and bend outwards on each side; there is a patch of bare scarlet skin over each eye, and this is inflated in the breeding season. The female, or grey hen, is a much smaller bird, little more than 2 lbs. in weight; general plumage rusty brown, barred and mottled with black or dark brown; under tail-coverts white, tail orange-brown, with slight tendency to become curved. The plumage of the young birds is like that of the females. The males are polygamous, and during many weeks they congregate in numbers to fight together, and to display their charms before the hens. The hen lays from six to ten eggs, white, speckled with orange-brown, in a rudely constructed nest, generally among long, coarse

BLACKCOCK (*Tetrao tetrix*).

grass in some marshy spot. The male takes no part in incubation. These birds feed on the seeds of rushes and other plants, the shoots of heath, berries, worms, and insects, and often visit cornfields and stubble for grain. In winter they eat the tops and buds of birch and alder, and the tender shoots of young firs. They are highly esteemed for table. The shooting season opens on August 20th and closes December 10th, with some slight local variation. The blackcock was formerly common in the south of England, where now it is becoming rare. It is more common in the north of England, and abundant in Scotland. It is found in Scandinavia, on the mountain ranges of central Europe, and through Siberia to Manchuria and the north of China. Cases of hybridism between the blackcock and other game birds are recorded.

Black Corals. [ANTIPATHARIA.]

Black Death, the name applied to a series of epidemics which occurred during the fourteenth century. The disease seems to have originated in the East, it raged in Southern Europe during 1346 and 1347, and first appeared in England in 1348. From 1349 to 1357 a large mortality was attributed to the Black Death in this country. It is not certain whether the epidemics of later years, 1361 and 1368, were of the same or of different nature. According to some authorities the Black Death was the disease now known as Oriental Plague. [PLAGUE.] The symptoms appear to have been in many respects similar to those of this disease, and glandular swellings or buboes were common; but in Black Death there was apparently a greater tendency to hæmorrhage than in true plague, and particularly to hæmorrhage from the lungs. [HÆMOPTYSIS.] The purpuric blotches which were seen on the skin gave rise to the name Black Death; such petechiæ are by no means uncommon in severe cases of true plague. The mortality in England has been variously estimated at from ⅓ to ¾ of the entire population;

100,000 deaths are said to have occurred in London alone. Certain it is that the number of deaths was so large as to completely revolutionise the social economy of the time. The reign of Edward III. is regarded by modern economists as one of the critical periods in the history of labour, and it cannot be doubted that the alteration brought about, by the enormous mortality, in the value of labour, was the main cause of the social disturbances of the close of the fourteenth century.

Black Draught, the name applied to a purgative mixture, the main ingredients of which are infusion of senna and sulphate of magnesia.

Blackfeet. 1. A Dakota tribe whose real name is Sihasapa, one of the original members of the "Seven Great Council Fires," now divided, but famous in tradition and known to the early white pioneers. [DAKOTA.] 2. A warlike Algonquin nation, westernmost branch of that family, south of the Saskatchewan, and as far west as the Rocky Mountains; formerly also in Wyoming, where the curious pictograph carvings on a rock near Fort Washakie about the headwaters of Sage Creek, were probably executed by them. The Blackfeet domain, over 130,000 square miles in extent, was conterminous southeastwards with that of their hereditary foes the Prairie Crees, whom they drove from the north fork of the Saskatchewan southwards to the Red Deer affluent of the south fork. Three main branches, *Blackfeet* proper (*Satsika* or *Sinika*), 4,000; *Piegans*, 2,000; and *Blood Indians* (*Kena*), 1,500; total population about 7,500. The Blackfeet were essentially a hunting people and their territory has been much reduced since the disappearance of the bison. Many have become Christians, but the Piegans—a word said to be a corruption of the English *Pagan* — are still nature worshippers; their chief deity is *Natûs*, the Sun. See *Reports* of the Bureau of Ethnology for 1882–3, Washington, 1886.

Blackfish, a popular name loosely applied to several fish of black or dusky hue, and sometimes improperly used to denote small whales and dolphins. In England the name is chiefly given to *Centrolophus pompilus*, a perciform fish of the acanthopterygian family Stromateidæ, found in European seas, and occasionally reaching our south coast. Yarrell records a specimen 32 inches in length, and 14 lbs. in weight, but individuals of this size are rare. There is another British species (*C. britannicus*). In America the name is given to the genus Centropristis, and to the Tautog (q.v.).

Black Forest, a range of wooded mountains called in German Schwarzwald from the dark foliage of its trees, is situated in the S.W. part of Germany in Baden and Würtemberg. Its length is about 90 miles, and breadth from 18 to 30 miles. Its southern and western sides bound a portion of the Rhine basin, and it is the source of the rivers Danube, Neckar, Murg, Kinzig, Elz, Enz, and Wiessen. In the south is the Feldberg, the highest summit of the range, reaching an elevation of nearly 5,000 feet; other high points are the Belchen and the Kandel. Geologically the Black Forest is chiefly composed of granite, and there are silver, copper, iron, lead, and cobalt mines. It is noted also for its mineral waters, those of Baden-Baden and Wildbad being especially famous. Its trees comprise fir, suitable for masts in shipbuilding, pine, beech, and maple. At the foot of the mountains are many picturesque valleys, of which the Murgthal and the Höllenthal are distinguished for their natural beauties. Villages are interspersed throughout, the inhabitants being mainly engaged in the rearing of cattle and the manufacture of toys, especially wooden clocks. The district is now traversed by railways, some remarkable for their engineering.

Black Friars, the name given to monks of the Dominican order (q.v.). The term is also applied to a district of London first inhabited by these friars, and situated between St. Paul's and the Temple.

Black Friday, a term applied to various days on which some calamity has happened, or some bad news has been announced. Perhaps the best known is the 6th of December, 1745, when the tidings of the Pretender's arrival at Derby reached London.

Black Flux consists of a mixture of crude tartar, saltpetre, bottle glass, and a little borax, melted together and finely powdered. It is largely used in assaying.

Blackguard, originally a scullion or humble servant in a wealthy household, whose duty it was to clean and protect the pots and pans. Later, the term was applied to one of low moral character.

Blackheath, a suburb in the S.E. district of London, near Greenwich Park. The heath itself covers an area of about 70 acres, and was the first ground in England that the game of golf was played on. Among its historical associations are the risings under Wat Tyler and Jack Cade. It was also a favourite haunt of highwaymen.

Black Hole of Calcutta, an unventilated room 18 feet square, into which 146 English prisoners were thrust on June 20th, 1756; only 23 survived the night, all the rest being suffocated.

Black House, the name given to a rude kind of dwelling common in the islands of Lewis and Harris, and less so in Scotland, and so called to distinguish them from white stone houses. These houses are built of rough stones, and consist of a main portion and a wing on each side. In the smaller wing is the door with a passage containing a quern and a stall for calves and lambs, and leading to the central part in which are the larger cattle, separated from the human inhabitants by a line of rough stones. The farther wing is used as a barn and sleeping place. There are no windows; their seats are planks placed on sods or simply piles of sods, with a three-legged stool for the wife. The beds consist of four rough uprights, bound together with side pieces, and having a wooden bottom covered with loose straw.

Blackie, JOHN STUART, scholar, was born in 1809 at Glasgow. He studied at Aberdeen and Edinburgh, and in Germany and Italy. In 1841 he

became professor of humanity in Marischal College, Aberdeen, and in 1852 of Greek in Edinburgh University, which position he resigned in 1882. Amongst his varied works the chief is *Self Culture*, published in 1874; others are a metrical translation of Goethe's *Faust*, 1834; of *Æschylus*, 1850, *Homer and the Iliad*, with a translation of the *Iliad* in ballad measure, 1866; *War Songs of the Germans*, 1870; a *Life of Burns*, 1888; contributions to philology, etc. He was a strong advocate of a reform in the pronunciation of ancient Greek. The foundation of a chair of Celtic in Edinburgh University was due to his exertions, and he was an ardent supporter of the preservation of Scottish nationality in all its forms. He died in 1895.

Blacking, a polish employed chiefly for boots and shoes; introduced into England from Paris in the 17th century, but now being fast superseded by polishing pastes. It generally consists of bone black with fatty matters, and frequently some treacle and sulphuric acid added. Liquid blackings for kid shoes, etc., are generally some form of spirit varnish coloured by aniline black.

Black Jack, the name by which blende (q.v.) is known amongst miners.

Black Lead. [CARBON.]

Black Letter, the name given to the old English character, because of its blackness. [This is printed in Black Letter.]

Black List, the name specially given to lists of bankrupts or insolvents published in London generally once a week. Societies also exist of a more private nature for furnishing information concerning persons of shady character or doubtful honesty, with the view of protecting traders, etc.

Blacklock, THOMAS, clergyman, was born in 1721, at Annan. While still an infant he lost his sight. His father, a bricklayer, used to read to him such books as Spenser, Milton, Prior, Pope, etc. He, too, began to write poetry, which attracted the attention of Dr. Stevenson, an Edinburgh physician, by whose assistance Blacklock received a good education, and became a licensed minister in the established kirk in 1759. After two years as minister of Kirkcudbright, he resigned in 1764 on a small annuity, which he eked out by teaching in Edinburgh. It was a letter from him that induced Burns to give up his intention of going to the West Indies; a conversation between Blacklock and Dr. Johnson is also given in a *Tour to the Hebrides*.

Blackmail, money paid by property owners to freebooters and robbers as the price of protection from pillage. The system of blackmail existed until the middle of the 18th century in the Highlands of Scotland. Later, the term gained a wider significance and is applied to all payments which are extorted by threats of exposure, etc.

Blackmore, SIR RICHARD, physician and writer, was born at Corsham, Wiltshire. After being educated at Westminster school and Oxford he became a schoolmaster. He then spent some time on the Continent, taking the degree of M.D. at Padua, and on his return to England being admitted fellow of the Royal College of Physicians in 1687. In 1697 (having pronounced strongly in favour of the Revolution) he was appointed one of the king's physicians and knighted by William. He also continued to be one of the court physicians under Queen Anne. Meanwhile, between 1695 and 1723, he had published seven epics, viz. *Prince Arthur, King Arthur, Eliza, Creation, Redemption, Nature of Man*, and *Alfred*, all of which are now regarded as insufferably dull. He also wrote some theological works and medical treatises. He died in 1729 at Boxted, Essex.

Blackmore, RICHARD DODDRIDGE, novelist, was born in 1825 at Longworth, Berkshire. Educated at Tiverton school and Exeter College, Oxford, he graduated B.A. in 1847. In 1852 he was called to the Bar at the Middle Temple. Amongst his novels the best known, *Lorna Doone: a Romance of Exmoor*, was published in 1869. He also published some poems and a translation of Virgil's *Georgics*. He died in 1900.

Blackpool, a town of Lancashire, England, is on the west coast, north of the estuary of the Ribble. It is chiefly noted as a bathing place, and is sometimes called the "Brighton of the North." Pop. (1901), 47,346.

Black Prince, THE, the name by which Edward, Prince of Wales, son of Edward III., is usually known, was born in 1330 at Woodstock. He early distinguished himself as a soldier in the wars with France, leading a division at Crecy when only sixteen. In 1356 he won the battle of Poitiers, taking King John and his son prisoners, with whom in the following year he entered London in triumph. In 1361 he married Joan, the Fair Maid of Kent, widow first of Sir Thomas Holland, and next of the Earl of Salisbury; and having been created Duke of Aquitaine, settled in 1363 at Bordeaux. His next exploit was an expedition in support of Pedro the Cruel, who had been deposed from the Castilian throne by his brother, Henry of Trastamare. The Black Prince, crossing the Pyrenees, defeated Henry at Navarette; but Pedro, who had promised to pay the expenses of the expedition, failed to do so, and the Prince was obliged to tax his subjects. This led to a fresh rupture between England and France, and during the hostilities that ensued occurred the capture of Limoges, at which the Prince cruelly ordered the massacre of every soul found within its walls. This is the only stain on his chivalrous character; it was also the crowning act in his military career. In 1371 he returned to England, and died at Westminster in 1376, being interred in Canterbury Cathedral.

Black Quarter (*Charbon symptomatique, Rauschbrand*), a disease of cattle, between which and true anthrax (q.v.) some confusion has arisen. A bacillus has been found in cases of charbon symptomatique resembling, but not identical with, the bacillus anthracis.

Black Rod, fully designated GENTLEMAN USHER OF THE BLACK ROD, an official of the House of Lords, who acts as messenger to the Upper

House, summons the House of Commons to hear royal assent given to bills, takes into custody any peer who is charged with a breach of privilege or contempt, etc. He carries a black rod surmounted by a gold lion.

Black Sea, or EUXINE (ancient name *Pontus Euxinus*), lies between Europe and Asia, with Russia on its N. and E., and Turkey on its S. and W. Its area is estimated at about 170,000 square miles, its greatest length being 700 miles, and greatest breadth 400 miles, and coast line 2,000 miles. As to its depth it increases uniformly with the distance from the shore, and in the centre the bottom has not been reached at 1,070 fathoms. It receives from Europe the waters of the Danube, Dniester, Bog, Dnieper, and Don, and from Asia the Kizil-Irmak and Sakaria, draining an extent of territory in Europe and Asia of about 1,000,000 square miles, one of the largest drainage areas in the world. On the S.W. it communicates with the Mediterranean by the Bosphorus, the Sea of Marmora, and the Dardanelles; and on the N.E. with the Sea of Azof by the Straits of Yenikale. It has only one island, Serpent Isle. Odessa is its chief port from a commercial point of view; others are Kherson, Eupatoria, Sebastopol, Batoum, Trebizond, Sinope, and Varna. Of its peninsulas the most celebrated is the Crimea, on its N. shore. There is no noticeable tide in this sea, but strong currents are occasioned by the large bodies of water that flow into it, and these set for the most part towards the Bosphorus. Its waters are not so salt as the ocean, and easily freeze, the northern ports being blocked for several months in winter time. Though there are great varieties of fish, yet the fisheries are unimportant, being confined mainly to sturgeon in the Straits of Yenikale. The Black Sea has long been known to navigators, and has played an important part in ancient as well as modern times. At one time Russia endeavoured to close it against the ships of other nations; since the Crimean war, however, it has been open to all trading vessels. In 1856 it was neutralised by treaty, and interdicted to war-ships with certain trifling exceptions. In 1870, during the Franco-German war, Russia announced that she would no longer be bound by these restrictions, and they were abrogated in 1871.

Black Snake, a popular name for several snakes, from their coloration. In America it is applied to (1) *Coluber constrictor*, a large non-venomous snake found in the Mississippi valley and to the eastward; uniform lustrous black above, varying to olive or leaden below, chin and throat white. It feeds on birds, frogs, and small mammals, and is the deadly foe of the rattlesnake, which it boldly attacks and crushes in its folds. (2) *Elaphis obsoletus*, also harmless, found east of the Rocky Mountains; light reddish-brown, darkening with age till nearly or quite black. Both species run into varieties. The black snake of Australia (*Pseudechis porphyriacus*), black above and red beneath, is closely allied to the cobra (q.v.), and is very venomous.

Blackstone, SIR WILLIAM, one of the most eminent of judges and the most important English legal text writer of the 18th century (if not of all time). He was the writer of the commentaries on English law, known as *Blackstone's Commentaries*, which to the present day retains its sterling value as an authority in the profession of the law. There have been many editions of this important work by legal writers of great ability; in the best of such editions the very text of the original work has been retained (enclosed in brackets) adding, of course, the modern law and alterations or improvements on each particular subject. Stephens' *Blackstone's Commentaries* is the last edition of this work, and is on the lines stated.

Sir William Blackstone was the son of a silk mercer, and was born in London in 1723. He was educated at the Charter House; at 15 years of age he was at the head of that school, and in his 16th year went to Pembroke College, Oxford. He afterwards entered the Middle Temple and wrote *The Lawyer's Farewell to his Muse*, as also several small pieces of verse, and obtained the gold medal for verses on Milton. In 1743 he was elected a Fellow of All Souls' College, Oxford, and three years afterwards was called to the bar. He afterwards withdrew to Oxford, purposing to lead an academic life, but in 1749 he was appointed Recorder of Wallingford, Berks, on the resignation of his uncle. In 1758 was appointed the first Vinerian Professor, in which character he delivered a course of lectures at Oxford on Law, which attracted many students, among whom was Jeremy Bentham. He happened to get engaged as counsel in a contested election case concerning the rights of copyholders, and he afterwards published his opinion on the subject. He denied these rights; in the result an Act of Parliament was passed doing away with them. He became so popular from his lectures and a new edition which he wrote of the *Great Charter*, and *Charter of the Forest*, that he ultimately found his way to the law courts in the metropolis, and obtained extensive practice. He became member of Parliament for Hindon in 1761. In 1762 he was granted a patent of precedence as king's counsel, and in the next year he became solicitor-general to the queen. The first volume of the original commentaries on the laws of England was published at Oxford in 1765, the other three volumes appeared at intervals shortly afterwards. In 1770 he was made one of the justices of the Court of Common Pleas (which position he filled till his death in 1780). He was the author of an *Analysis of the Laws of England*, a distinct work from the *Commentaries*, also of some law tracts and volumes of reports. As a judge he had great respect for the traditions of the bench, and his political opinions were moderate. The University of Oxford contains several memorials in his honour. In 1784 a statue of him by Bacon was erected in All Souls' College. He had nine children, seven of whom survived him.

Blackthorn (*Prunus spinosa*), a straggling shrub, common in hedgerows, with spinous branches. It is "precocious," producing its small white flowers on its blackish branches before the appearance of the leaves. Its wood is hard and

tough, taking a fine polish, and is used for walking-sticks, and, in Ireland, for shillelaghs. The leaves were formerly used to adulterate tea. The small, round, harsh fruit, which is a plum in miniature, with a bloom on its surface, is known as a *sloe*, and is used in rustic distillery.

Black Watch (from the *black* colour of their tartan), the name given to the companies of Highlanders raised to preserve peace in the Highlands after the rebellion of 1715. In 1739 they were formed into the 42nd regiment, which in 1881 became the first battalion of the Black Watch (Royal Highlanders).

Blackwater, the name of several rivers in Ireland. 1. Rises in the S. of county Tyrone, which it divides from Monaghan and Armagh. It flows into Lough Neagh. At one time it was the boundary between the English Pale and the Tyrone O'Neills. 2. Rises on the borders of Kerry and Limerick. Its course is for the most part easterly, and it falls into St. George's Channel through Youghal harbour. It is celebrated for the beauty of its scenery. There are many other streams with this name.

Black Water, a disease of cattle which derives its name from the fact that dark-coloured blood is found in the urine of affected animals.

Blackwell, ALEXANDER, physician, was born in Aberdeen about the beginning of the 18th century. About 1730 he seems to have been a printer in London, becoming bankrupt in 1734, and being cast into a debtor's prison, where he was supported by his wife Elizabeth Blackwell (q.v.). He afterwards wrote a book on agriculture, which attracted the notice of the king of Sweden, and led to his removal to that country. Here he was convicted of conspiracy against the royal family, and beheaded in 1747. ELIZABETH, his wife, published in 1737 *A Curious Herbal, containing Five Hundred Cuts of the most Useful Plants which are now used in the Practice of Physic*, and with the proceeds freed her husband from prison.

Blackwell, ELIZABETH (1821–1910), born at Bristol. In 1831 she accompanied her family to America, where her father dying and leaving her mother destitute, she opened a school at the age of seventeen, devoting her leisure to the study of books on medical subjects. She applied to the medical schools of Philadelphia and Boston for admission as a student, but was in each instance refused. Ultimately, however, she succeeded in gaining admittance to the medical school of Geneva, N.Y., and graduated M.D. in 1849. She then visited Paris and London, being admitted in the former place to the *Maternité* hospital, and in the latter to St. Bartholomew's. Returning in 1851 to New York, she there set up a practice as a doctor; published in 1852 *The Laws of Life*; and in 1854 with a sister opened the New York Infirmary for women and children. Returning to England she later founded the National Health Society in London, and also (partly) the London School of Medicine for Women. She died in 1910.

Blackwood, THE HON. SIR HENRY, fifth son of Sir John Blackwood, Bart., was born in 1770, and having entered the navy, was senior lieutenant of the *Invincible*, 74, in the action of the glorious First of June, 1794. As captain of the *Penelope*, 36, he particularly distinguished himself in the capture of the *Guillaume Tell*, 84, on March 31, 1800. In 1801 he participated in the operations in Egypt; and at Trafalgar, in command of the *Euryalus*, 36, acquired deserved fame. In 1807, in the *Ajax*, 80, he accompanied Duckworth to the Dardanelles, but had the misfortune to lose his ship by fire. He was promoted to be rear-admiral in 1814; from 1819 to 1822 he commanded in the East Indies; and from 1828 to 1830 his flag was flying at the Nore. He died a vice-admiral in 1832. He was one of the captains in whom Nelson reposed the utmost confidence, and as a frigate commander he was in his day unrivalled.

Blackwood, WILLIAM, publisher, was born in 1776, at Edinburgh, where after an apprenticeship with a bookseller, and further experience in Glasgow and London, he in 1804 started for himself. On April 1st, 1817, he issued the first number of the *Edinburgh Monthly Magazine*, which on October 1st was issued as *Blackwood's Edinburgh Magazine*. Among Blackwood's principal advisers and contributors were Professor Wilson and Lockhart, and the new publication was immediately successful. Among publications that have issued from the house founded by William Blackwood are the *Edinburgh Encyclopædia*, edited by Sir David Brewster, and begun in 1810, Sir Archibald Alison's *History of Europe*, and George Eliot's novels. He died in 1834.

Bladder. The urinary bladder is a hollow receptacle in which the urine accumulates between the intervals of micturition. Into it open the ureters, and from it passes the urethra. The adult bladder is capable of holding about one pint; it lies in the pelvis, to the walls of which it is attached by various ligaments. Lining the interior of the bladder is a mucous membrane, and this is enveloped by a muscular coat, and finally the bladder is invested in part by peritoneum. The upper part of the bladder is called the apex, the portion adjoining the urethra is termed the neck, and the triangular area mapped out by the orifices of the two ureters and the urethra is called the trigone. Inflammation of the bladder is called cystitis. Tumours may develop, too, in connection with this viscus. For stone in the bladder, *see* Calculus. The bladder sometimes requires to be punctured to relieve distension in cases of retention of urine.

Bladder-nut, a name applied to *Staphylea pinnata* and *S. trifoliata*, shrubs belonging to the sub-order *Staphyleæ* in the order Sapindaceæ. They have opposite, stipulate, pinnate leaves, and pendulous clusters of small white flowers succeeded by an inflated capsule of two or three partly-united carpels. Their geographical distribution is wide, and they are grown for ornament in our shrubberies.

Bladderwort, the popular name for the species of the interesting genus of dicotyledonous plants,

Utricularia. They are aquatic plants with little or no roots, and with submerged leaves, much divided, and bearing numerous small bladders or "ascidia." These have a trap-door opening inwards, and are lined by four-rayed hairs. Numerous small aquatic animals, water-fleas, etc., enter these bladders, and are apparently suffocated, the hairs absorbing the liquid product of their decay as a manure. There is no true digestion. The bladders do not serve as floats. The flower is personate, and in some foreign species large and ornamental. *Utricularia nelumbæfolia*, a native of Brazil, which has round peltate leaves, lives in the water in the hollowed leaves of a Tillandsia. There are about 120 species in the genus, four of which are British, and these and others are widely distributed over the globe. They sometimes bear tuber-like structures.

Bladder-wrack, the popular name for those olive-brown algæ of the genus *Fucus*, which have air-bladders or floats hollowed out in the tissue of their frond-like thallus. *Fucus vesiculosus*, with a midrib and its bladders in pairs on each side of it, and *F. nodosus*, with a narrow thallus, no midrib, and bladders arranged singly, are the commonest sea-weeds on our coasts, where they were formerly collected as kelp, and are still used for manure and for iodine baths. *F. vesiculosus* is the essential constituent in the remedy for obesity known as "anti-fat," and owing to the iodine it contains has been used, in a charred condition, for tumours, under the name of "vegetable ethiops."

Blaen, WILLEM JANSZOON, map-drawer, was born in 1571, at Alkmaar, Holland. He executed terrestrial and celestial globes in a manner that had never been approached. His death occurred in 1638.

Blaen, JAN, son of the preceding, published *Atlas Major* (11 vols.), also a series of topographical plates and views of towns.

Blaine, JAMES GILLESPIE, statesman, was born in 1830, at Brownsville, West Pennsylvania. For a time he was professor in small colleges, to which his subsequent title of "the scholar in politics" is doubtless due. In 1854 he was a journalist at Augusta, Maine, and from 1858 to 1862 sat in the State legislature, from 1862 to 1876 in the House of Representatives. In 1876 he was elected United States senator for Maine. In 1884 he was nominated for the presidency, but was defeated by Cleveland. In 1886 he accepted under President Harrison the secretaryship of state, a position he had held under President Garfield. He was the author of *Twenty Years in Congress.* He died in 1893.

Blainville, HENRI MARIE DUCROTAY DE, naturalist, was born in 1778 at Argues. Through Cuvier he was led to take an interest in natural science, and in 1812 was appointed to the chair of anatomy and zoology in the Faculty of Sciences, Paris, succeeding Cuvier in the professorship of comparative anatomy at the Jardin des Plantes. He died in 1850. His success in authorship was as pronounced as in teaching, and amongst his best known works are: *De l'Organisation des Animaux, ou Principes d'Anatomie Comparée*, 1822; *Cours de Physiologie Générale*, 1833; *Osteographie*, 1839–1864, etc.

Blair, HUGH, clergyman, was born in 1718 at Edinburgh, where he studied, and after occupying the established pulpits of Collessie, Fifeshire, Canongate, Lady Yester's, and the High church, Edinburgh, he was appointed, in 1762, professor of rhetoric at the university. He wrote a *Dissertation on the Poems of Ossian*, published his *Lectures* and *Sermons*, which attracted the notice of George III., who conferred on Blair a pension of £200 a year in 1780. He resigned his professorship in 1783 and died in 1800.

Blair, ROBERT, Scottish divine, was born in 1699 at Edinburgh. Educated for the church, he was appointed in 1731 minister of Athelstaneford, where he wrote his well-known poem, *The Grave*, published in 1743, and where he died in 1746.

Blair-Athole, Scottish village in Perthshire, at the junction of the Garry and Tilt, 30 miles N.N.W. from Perth and 20 N.N.W. from Dunkeld. Near it is Blair Castle, the seat of the Duke of Athole.

Blake, ROBERT, one of the greatest commanders that have served England, was born in 1599 at Bridgwater, Somersetshire, where his father was a wealthy merchant. From 1615 to 1622 young Blake, who had previously been educated at Bridgwater grammar school, was at Wadham College, Oxford, where he took his B.A. degree in 1617. Upon leaving Oxford he appears to have devoted himself to elegant pursuits and the life of a country gentleman, until, in 1640, he was elected member of Parliament for his native place. When the Civil war broke out he linked his fortunes with those of the Parliament, and, having raised a troop of dragoons, became in 1645 governor of Taunton. He was there beseiged by Lord Goring, but, amid great disadvantages and discouragements, defended the place until the siege was raised. He did not, however, agree with all the actions of the Republican party, and strongly disapproved of the execution of the king. Not until February, 1649, did he become associated with the service in which he was destined to gain undying renown. In that month he was appointed a commissioner of the navy, and soon afterwards he was sent with a force in pursuit of Prince Rupert's semi-piratical squadron. He shut the prince up in Kingsale harbour, and followed him closely when he broke the blockade. Rupert then took refuge in the Tagus, where the Portuguese afforded him protection in spite of Blake's remonstrances, whereupon Blake, in retaliation, attacked the home-coming Portuguese fleet from Brazil and took or destroyed 20 sail of it. Having carried home his prizes, he returned to pursue Rupert, whom he chased into Carthagena and thence into Malaga, where he fell upon him, destroyed three of his ships, and obliged the prince to retire to the court of Spain. Blake continued in the Mediterranean until 1651, making the flag feared and respected there, and taking many prizes. Upon his return he was appointed warden of the Cinque Ports. In 1652, just before the outbreak of war with Holland, which

was then the most formidable naval power in the world, Blake was created admiral for nine months. Lying with but 20 ships in the Downs, he began the war by attacking Tromp, who came there with 45 sail and who refused to strike his flag to him. Being fortunately reinforced, he drove off the Dutch with a loss of two of their ships. This was on May 18. In July Blake met and took the whole Dutch fishery fleet and its convoy, and in September he chased De Witt and De Ruyter in running fight from the Kentish Knock into Goree, capturing or destroying several of their vessels. Blake went back to the Downs, where, in a short time, he found himself with only 40 ships. In this situation he was furiously attacked by 80 vessels under Tromp, and was, as might be expected, badly beaten. He lost 6 ships, but on the other hand he destroyed at least one of the enemy. His temerity in accepting battle on this unfortunate occasion must, upon the whole, be blamed; but it was Blake's sole tactical mistake of any importance, and, happily, the great leader was soon able to win a compensating advantage. By February, 1653, he had managed to increase his fleet to 80 sail. With Monk and Deane as his associated "Admirals and Generals at sea," he sighted Tromp, who had nearly 100 sail, and on February 18th defeated him, though not decisively, off Portland. Following up his success, he chased the Dutch to their coasts. In April, 1653, Cromwell, much apparently to Blake's disappointment, assumed supreme authority; but the admiral, who fully realised that, after all, the external troubles of his country were its more serious ones, had long since ceased to take an active part in politics. "It is not," he said, "the business of a seaman to mind state affairs, but to hinder foreigners from fooling us. Disturb not one another with domestic disputes, but remember that we are English and our enemies are foreigners; enemies which, let what party soever prevail, it is equally the interest of our country to humble and restrain." A very few days after Cromwell's assumption of power Blake again drove the Dutch into the Texel, and there blockaded them, until, hearing that Tromp was at sea with 120 ships, the admiral went in search of him. He found him on June 3rd, 1653, off the coast of Essex, and having fought him for two days, gained a considerable success, though not without the loss of Deane, who was killed by a cannon-shot. In the next year a new field was found for Blake's energies, in the Mediterranean, where Algiers was intimidated and Tunis forced into surrendering all English captives. In 1656, the admiral, there being war with Spain, cruised in the neighbourhood of Gibraltar; and in 1657, having heard of the presence of a Spanish treasure-fleet at Santa Cruz, Teneriffe, he went thither, and, in a manner which for conduct and gallantry has never been exceeded, not only silenced the numerous and heavily-armed batteries on shore, but also destroyed every one of the galleons. It was a glorious exploit, and it was a fitting close to a glorious career. Returning in his flagship, the *St. George*, Blake, whose devotion to his country's welfare had seriously undermined his health, died on Aug. 17th, 1657, as his fleet was triumphantly entering Plymouth Sound. His body was buried in Henry VII.'s Chapel at Westminster; but, at the Restoration, was taken up and thrown into a pit in St. Margaret's churchyard. There is now a memorial window in St. Margaret's, Westminster, and a statue in the market place of his native town. He was, indeed, a great Englishman; he first made the English flag generally respected at sea; and in the whole of her history Britain has had no sea-captain of whom, in all respects, she can feel prouder. Indeed he is one of the very few great commanders whose characters appear to be without flaw.

Blake, WILLIAM, painter and poet, was born in 1757 in London. At the age of 14 he was apprenticed to an engraver for seven years, proceeding in 1778 to the school of the Royal Academy, where he studied from the antique and began to draw from the living model. In 1780 he exhibited his first picture, *The Death of Earl Godwin*, in the Royal Academy's first exhibition in Somerset House; and after marrying in 1782 Catherine Boucher, who proved of great assistance to him in his work, he opened a printseller's shop in Broad Street in 1784. Meanwhile, in 1783, he had published *Poetical Sketches*, which marked him as a coming poet. For his *Songs of Innocence* he was unable to find a publisher, and hit upon a plan of producing them himself, revealed to him in a dream, he used to say, by his dead brother Robert. Besides revealing the poet, this publication exhibited an inventive artist in decorative design. Among Blake's other best known works are: *Book of Thel*, 1789; *Marriage of Heaven and Hell*, 1790; *Gates of Paradise*, 1793; *Songs of Experience*, 1794; *The Book of Urizen*, 1794; *The Song of Los*, 1795; *The Book of Ahania*, 1795, etc. He illustrated Young's *Night's Thoughts*, Blair's *Grave* and *The Book of Job*. The strength of his genius lay in the vividness of his imagination. Though he commanded the patronage of the public to a very limited extent during his lifetime, his genius did not fail to attract friends whose kindly assistance relieved his declining years, which were passed in poverty. He died in 1827 at No. 3, Fountain Court, Strand, whither he had removed in 1820, and was buried in Bunhill Fields.

Blanc, JEAN JOSEPH LOUIS, historian and socialist, was born in 1811 at Madrid. He began his career as a journalist at Paris, and in 1839 founded the *Revue du Progrès*, in which appeared his principal Socialistic work, *De l'Organization du Travail*. This gained for the author a wide popularity amongst the working classes, and on the outbreak of the revolution of 1848 he was chosen a member of the provisional government and appointed president of the commission of labour. Accused of being implicated in the disturbances of the summer in the same year, he escaped to London, where he remained until the downfall of the empire. On his return to Paris he was elected to the National Assembly in 1871, and afterwards became a member of the Chamber of Deputies. Besides the work already mentioned, his writings embrace *Histoire de Dix Ans* (1841-4), *Histoire de la Révolution Française*, *Lettres sur l'Angleterre*

(1865–7), *Histoire de la Révolution de 1848*, 1870, etc. He died in 1882 at Cannes.

Blanchard, LAMAN, journalist, was born in 1804 at Yarmouth. In 1827 he was appointed secretary to the Zoological Society, and in 1831 became editor of the *Monthly Magazine*. His *Lyric Offerings*, dedicated to Charles Lamb, and published in 1828, received high commendation from Allan Cunningham and Lamb. In 1845, his mind having become unhinged through the death of his wife, he committed suicide.

Blanch-holding, or BLENCH-HOLDING, in Scottish law, a tenure by which the tenant is bound to pay only a nominal yearly duty, *e.g.* a peppercorn, to his superior as an acknowledgment of the latter's right.

Blanching, in *Horticulture*, a method of rendering plants white, and of depriving them of coarseness and bitterness, by growing them in a dark place. Seakale and rhubarb are reared in this way.

Blancmange, a table-dish made of isinglass, gelatine, corn-flour, arrowroot, ground rice, etc., boiled with sugar, milk, and flavouring substances. *Blancmange* used to contain fowl, meat and eggs.

Blanco, CAPE, *i.e.* White Cape, on the west coast of Africa, is a rocky projection from the Sahara, and lies in lat. 20° 47′ N. and long. 16° 58′ W.

Blandford, an English municipality, in Dorsetshire, stands on the Stour. Near it is Lord Portman's seat, Bryanston Park, and from it the Duke of Marlborough derives his title of Marquis of Blandford. Pop. (1901), 8,803.

Blandrata, GIORGIO, was born about 1515 at Saluzzo, Piedmont. In 1556 on account of his advanced religious views he had to take refuge in Geneva and ultimately in Poland, where he sowed the seeds of Unitarianism, dying about the end of the 16th century.

Blane, SIR GILBERT, physician, was born in 1749 at Blanefield, Ayrshire. After graduating M.D. he became physician to the fleet in the West Indies under Admiral Rodney. In 1783 he was appointed physician to St. Thomas's Hospital, London, bringing out in the same year his treatise *On the Diseases of Seamen*, and in 1795 was one of the commissioners on the Navy Medical Board. In this latter capacity he was instrumental in introducing lime-juice as a preventive of scurvy on board ship. Among his publications the chief was *Elements of Medical Logic*, 1872. He received his baronetcy in 1812, and died in 1834.

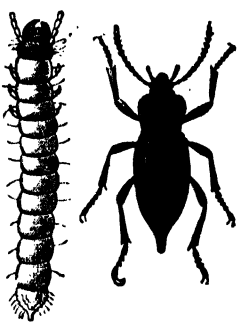
Blanket, a large piece of loosely-woven woollen stuff, used as a covering either for a bed or for a horse. Uncivilised people, such as the N. American Indians, use them as garments. In America very fine, expensive blankets are used.

Blank Verse, a kind of verse without rhyme, but possessed of rhythm. The term is usually applied in England to the iambic pentameter, which is mainly used in English dramatic poetry and epic poetry. All Shakespeare's plays are in blank verse, as is Milton's *Paradise Lost*.

Blanqui, JEROME ADOLPHE, political economist, was born in 1798 at Nice. While a student at Paris he acquired the friendship of J. B. Say, through whom he was induced to study economics, and whom in 1823 he succeeded as professor at the *Conservatoire des Arts et Metiers*. He was an advocate of free trade doctrines. His chief work is *Histoire de l'Economie Politique en Europe, depuis les anciens jusqu'à nos jours* (5 vols. 1837-42). He died in 1854 at Paris.

Blanqui, LOUIS AUGUSTE, revolutionary socialist, brother of the preceding, was born in 1805 at Nice. He was a leading figure in all the revolutionary movements of his time, and spent half his lifetime in prison for his extreme conduct. He died in 1881.

Blaps, the name of the type genus of a family of beetles, *Blapsidæ*, of which *B. mortisaga*, the common Churchyard Beetle, is the best known; their wings are generally obsolete, and when attacked they emit a liquid with an unpleasant odour.



BLAPS.
(*B. mortisaga*), *with larva.*

Blarney, flattery, cajolery, extravagantly complimentary language. The term is derived from the *Blarney-stone*, a stone in a village in county Cork in Ireland, which is fabled to endow with wonderful powers of flattery the person who succeeds in kissing it.

Blasius, ST., Bishop of Sebask, Armenia, suffered martyrdom in the persecution of Licinius, 316. He is titular patron of the woolcombers, who claim him on the ground that his flesh was torn by iron combs. His festival is February 3.

Blasphemy, according to *Blackstone's Commentaries*, an offence against God and religion, consisting in the denying the being or providence of God, or in contumelious reproaches of our Lord and Saviour Jesus Christ, and profane scoffing at Holy Scripture, or exposing it to contempt and ridicule. These offences are punishable at common law by fine and imprisonment, or other infamous corporal punishment. The Blasphemy Act, passed in 1698, enacts "that if any person educated in or having made profession of the Christian religion should by writing, preaching, teaching, or advised speaking deny any one of the persons of the Holy Trinity to be God, or should assert or maintain that there are more Gods than one, or should deny the Christian religion to be true, or the Holy Scripture to be of divine authority, he should upon the first offence be rendered

incapable of holding any office or place of trust; and for the second, incapable of bringing any action, of being guardian or executor or of taking a legacy or deed of gift, and should suffer three years' imprisonment without bail," but the prosecution must be commenced within four days of the blasphemy spoken, and is to be desisted from and all the penalties to be removed upon the defendant's renunciation of his heretical opinions. An act passed in 1813 excepts from these enactments persons denying as therein mentioned the Holy Trinity. In an important case occurring in the year 1867 the court reaffirmed a previous declaration of Chief Justice Hale, viz.:—*That Christianity was part of the Law of England* (to be found in *Blackstone's Commentaries*).

The commissioners on criminal laws (6th report) remark, that "although the law forbids all denial of the being and providence of God or the Christian religion, it is only when irreligion assumes the form of an insult to God and man that the interference of the criminal law has taken place."

In Scotland the punishment for blasphemy was formerly death. By an Act of Charles II., any person who, "not being distracted in his wits, should curse God or any person of the Blessed Trinity," was punishable with death; and by a statute passed in 1695 in King William's reign, any reasoner against the being of God or any person of the Trinity or the authority of the Holy Scriptures or the providence of God in the government of the world, was to be imprisoned for the first offence until he should give satisfaction in sackcloth to the congregation; to be punished more severely for the second offence, and for the third to be doomed to death; but by an Act passed in 1826, amended in 1837, blasphemy was made punishable by fine or imprisonment or both.

In the United States punishment is attached not only to this offence as above indicated, but to any language calculated to sap the foundations of society. [CURSING, SWEARING.]

Blast Furnace, the furnace used for the smelting of iron, *i.e.* the extraction of the metal from its naturally occurring compounds or ores. In shape, size, and proportions, blast furnaces vary considerably according to the nature of the fuel, the character of the ores, etc., employed. The general shape may be described as of two truncated cones, united at their bases, the angular junction being rounded off, forming the *boshes*. The furnace is built of firebricks; outside this, and separated by a space filled with sand, etc., is another layer of firebricks, and surrounding all are wrought iron plates united by rivets. The part of the furnace above the boshes is known as the *stack;* and the top portion of the stack forms the *throat*, which is generally capable of closure, to admit of the collection of the gaseous products. The bottom of the furnace constitutes the *hearth*, around which are openings through which the *twyers*, or pipes from the blowing engines, deliver the blast. In most cases the hot gases passing off from the furnace are utilised for the purpose of heating the blast. The front of the hearth is continued forward beneath an arch of the walls—*the tymp arch*—to form a cavity known as the *fore-hearth*. In front this is dammed by a block of firebrick supported by a metal *damplate*. On the top of the dam is a groove known as the *cinder notch*, through which, when the furnace is working, the slag runs into trucks placed to receive it. In the dam also is the *tapping hole*, which, except when open for the purpose of allowing the molten metal to flow out, is closed by a tightly rammed plug of clay. The height of such furnaces is about 70 feet. When starting the furnace, wood and coke are introduced, then layers of limestone and coke with small quantities of the ore, till the furnace is about one-third full. The wood is then ignited, ore, fuel, and limestone (the flux) being added lightly, and the blast slowly increased, the normal condition not being reached for some days. It is then kept continuously working or "*in blast*," by filling in from the top the mixture of ore, fuel and flux. The slag runs off as before stated, and the iron is tapped when necessary. The furnace itself remains in blast frequently for years without intermission. For the chemistry of the process *see* IRON.

Blasting, an operation of much practical importance in mining and civil engineering, for the removal of obstruction by explosives such as gunpowder, guncotton or other special preparations of nitro-glycerine. [EXPLOSIVES.] Thus in tunnelling through hard rocky material, holes of 1 to 1½ inch diameter are bored by hand or machine to the depth of a few feet, a cartridge of the explosive is pushed to the farther extremity of each hole, which is then *tamped* or blocked up with sand or clay sufficiently firm to prevent the explosion simply acting in the directly outward direction. A fuse leads from without to the embedded cartridge, and takes a known time to carry ignition to it; during this time the workmen retire and wait for the explosion in a sheltered spot. It is often expedient to fire a number of such charges at the same time, in which case electricity lends itself readily for the simultaneous heating of the fuses. Thus in the *mine-system* of blasting, where it is necessary to remove very large masses such as reefs or islets that obstruct ship-way, the rock is honeycombed with small tunnels, charges of the explosive are placed all over the area to be acted upon, and the fuses are connected by wires which lead to a safe distance, from which the firing may be effected by the passage of the electric current round the circuit. The best instance of this kind is that of the blasting away of a reef at Hell Gate, Long Island Sound, New York, where a charge of 120 tons of rapid explosive, distributed through about 20 miles of drill-holes, was fired in a single operation.

Blasting Gelatine is an explosive, or rather a class of explosives, consisting essentially of the combination of nitro-glycerine and nitro-cotton. It is manufactured by dissolving finely divided nitro-cotton in heated nitro-glycerine. The result is a gelatinous-looking mass. It is made up for use according to the purposes for which it is designed. For blasting it takes the form of solid

cylindrical cartridges; for gun charges it takes the form of thin cord-like filaments or of small cubes. One variety of it is known as Cordite; another as Maxim Smokeless Powder. Specially strong detonators are required to explode it, and confinement is needed to develop its power. It is unaffected by water; and if a little camphor or benzole be added to it in course of manufacture, it may be rendered almost insensible to explosion by shock or blow.

Blastocœle. [BLASTOSPHERE.]

Blastoderm, the term applied in Embryology (q.v.) to the flattened disc of cells resulting from the segmentation of the ovum, and in which the development of the embryo proceeds. The blastoderm divides into two layers, epiblast and hypoblast; and a third layer, the mesoblast, subsequently appears. From the epiblast are developed the cutaneous and nervous systems, from the hypoblast the epithelium of the alimentary tract with its ducts, and all other tissues of the body are derived from mesoblast.

Blastoidea, an extinct class of Echinodermata belonging to the group in which the body (calyx) is usually supported on a stem; in many of the Blastoids, however, this structure is absent. The calyx is small and ovoid or globular, and formed of a series of plates of which the most important are arranged in three zones: the lowest consists of three "basal" plates, above which is a circle of five radials, and partly between but mainly above these is a circle of five "interradial" plates. The radial plates are forked, and in the angle of each is the ambulacral field; at the sides of these are rows of pores which open below to a series of chambers known as the "hydrospires," which may be respiratory, reproductive, or both. The mouth occurs in the centre of the upper part of the calyx, and is surrounded by a circle of apertures, known as the spiracles, which lead to the hydrospires. The anus also opens in this circle. The group lived in the Silurian, Devonian, and Carboniferous periods, and in the last it obtained its maximum development and became extinct. The typical genus *Pentremites* is not found in England, the forms referred to it belonging really to the genus *Granatocrinus*.

Blastomere. [BLASTOSPHERE.]

Blastopore, the opening by which the central cavity of an embryo, when in the blastosphere (q.v.) stage, communicates with the exterior. This may persist either as the mouth in most worms and molluscs, or as the anus in *Serpula* (q.v.) and the limpet; or as both mouth and anus in some sea-anemones (*e.g. Peachia*); or it may be closed entirely, and the permanent openings formed elsewhere; or, as in the case of insects, it may never be formed at all.

Blastosphere, or BLASTULA. After the fertilisation of an ovum or egg it commences development by dividing into two; each half again divides, and these parts continue to sub-divide into 8, 16, 32, and so on, till the ovum is composed of a mass of a large number of cells. In this stage it is called a "morula," and each of these cells is a *blastomere*. In most cases these blastomeres arrange themselves in a single layer called the *blastoderm*, forming a spherical shell enclosing a central cavity. In this stage it is a *blastosphere*, and the cavity in it is the *blastocœle*, and it usually opens to the exterior by an aperture known as the *blastopore*. In some cases this pore may persist through life as either the mouth or anus of the adult, but in most cases it closes and the permanent opening form elsewhere. In some rare cases the blastocœle may remain as the body cavity of the adult.

Blastostyle, the stalk which bears the reproductive buds (gonophores) in some HYDROIDEA.

Blastula, the same as BLASTOSPHERE.

Blatta, or PERIPLANETA, the cockroach, an insect belonging to the order ORTHOPTERA, so that it is not a true beetle, though popularly known as the "black beetle." The body is invested in a hard brown coat or cuticle; it is divided into a number of distinct segments grouped into three divisions, head, thorax, and abdomen; the first bears two large eyes and a complex masticatory apparatus. The thorax is of three segments, and in the male bears three pairs of legs and two of wings; the front pair of the latter are hardened into elytra or wing cases, which, when the animal is at rest, cover and protect the soft flying wings. The female is wingless. The abdomen is of ten segments, and the only appendages are two small ones on the last segment. The animal breathes by a series of tubes ramifying through the body, and which open to the exterior by 20 pairs of "spiracles." The heart is a straight tube running along the back. The alimentary system is very well developed and complex. The nervous system consists of a ganglion above the mouth, from which proceeds a double chain of ganglia along the ventral side. As its name (*Periplaneta orientalis*) implies it is not indigenous to England, but has been imported from the East. The West Indian "Drummer," which belongs to the same family (*Blattidæ*) also occurs occasionally in England. The cockroach takes about six years to reach maturity.

Blauw-Bok (Dutch = *blue buck*), a South African antelope (*Ægoceros leucophæus*) living in small herds in the open plains. It is about six feet in length, and stands somewhat less than four feet high at the shoulder. The hide is black, and it is this colour, reflected through the ash-grey hair, that has given rise to the popular name used by the Dutch settlers, and to that of Roan Antelope by which the animal is known to sportsmen. The horns are long, curved, and marked with rings to within six inches of the tips.

Bleaching, in its wider sense, the elimination of colour from a substance, but in a restricted sense the destruction of the colour of organic fibres or fabrics by chemical means, so as to leave them white in appearance. The agent most commonly employed is chlorine, bleaching powder (q.v.) being used as the source of this element. The general mode of operation may be described in the case of cotton fabrics. Before bleaching, the separate pieces are stamped for purposes of

identification, then stitched together, and the loose fibres singed. They are thoroughly washed with water, mechanical contrivances being arranged for this as for all other processes. After washing they are subjected to the *lime boil*, *i.e.* passed through milk of lime and boiled with water. They are next passed through dilute hydrochloric acid, again washed, boiled with soda, some resin being also added, and subjected to another thorough washing with water. These operations have for their object the removal of mechanical, fatty and other impurities. The fabrics are now ready for treating with the bleaching liquor—*chemicking*—and are immersed for six or eight hours in a solution of bleaching powder which it is necessary should be perfectly clear. The bleaching powder itself produces no decolorisation, and subsequent treatment with a dilute acid is necessary, which liberates the chlorine contained in the bleaching powder. The fabric is therefore immersed in dilute sulphuric acid and finally thoroughly washed and dried.

In the case of linen, which does not bleach with the ease and rapidity of cotton, the operations of chemicking and washing with acid have to be repeated two or three times. Wool and silk are not bleached with chlorine, but by means of a solution of sulphurous acid (H_2SO_3), being first, as in the case of cotton, well washed and cleansed from all impurities.

Bleaching Powder is prepared by the action of chlorine on slaked lime. The lime should be free from iron or manganese, which are frequent impurities, and is slaked with water, great care being needed, as too much or too little is detrimental to the final product. It is then spread in thin layers over the floor of the "chambers," which are made of lead or stone. The chlorine is then passed over, the supply being regulated so as to keep the temperature below 60°. The constitution of bleaching powder has been the source of much discussion among chemists. The formula Ca(OCl)Cl probably expresses it better than any other yet suggested. By the action of dilute acids, as vinegar, chlorine is liberated:

$$CaOClCl + 2HCl = CaCl_2 + OH_2 + Cl_2.$$

This chlorine is the active bleaching agent, and so the "bleach" is generally valuated by the amount of "available chlorine."

Bleak (*Alburnus lucidus*), a small British fresh-water fish of the Carp family; found also in most European rivers north of the Alps. It is rarely more than 7 inches long, greenish or brownish above, and silvery white below. The upper jaw is protractile, but does not extend as far as the lower jaw. Bleak are cooked like sprats; and the crystalline deposit beneath the scales is used in the manufacture of artificial pearls, hollow glass beads being washed in the interior with this substance and then filled with white wax.

Bleeding, or HÆMORRHAGE. External hæmorrhage, or bleeding from a wound, is a condition which anyone may be required to treat, and in which everything depends upon prompt and intelligent action. The bleeding may be *arterial*, *venous*, or *capillary*. If the first, bright red blood escapes in a forcible stream, and in spurts corresponding with the heart beats; in venous hæmorrhage the blood is darker and the stream continuous; while in capillary hæmorrhage there is a loss of blood by gradual oozing from the wounded surface. If the flow is at all considerable no time must be lost in controlling the bleeding point; this is readily done by applying pressure. The forefinger firmly compressed upon the spot from which the blood comes will at once temporarily arrest hæmorrhage, even from a large vessel; such pressure must be steadily maintained until skilled assistance can be procured. If an artery of one of the limbs is injured, a handkerchief may be tightly tied above the wound, or digital pressure may be made in the course of the vessel involved, this latter procedure requiring, of course, some anatomical knowledge. In bleeding from a vein the pressure requires to be applied on the side of the wound which is more remote from the heart. A useful mode of applying pressure with a handkerchief is to tie it somewhat loosely, and then insert a stick between it and the limb, twisting the stick round until the requisite degree of tightness is attained. A graduated compress, made with pieces of lint of increasing dimensions, forming a sort of cone, the apex of which is applied to the point where pressure is to be made, is of value where bleeding has to be controlled for some period of time; but after all, the main thing to rely upon in emergency is the tip of the finger, making sure that this is pressed upon the bleeding point.

The various surgical means of arresting hæmorrhage are as follows:—

Pressure, invaluable as a temporary expedient, is the sole means relied upon in many wounds involving the scalp or palm of the hand. For applying pressure in the course of an artery, *see* TOURNIQUET.

Cold excites contraction of the muscular fibres of blood-vessels; cold injections are of use in bleeding from the nose.

Heat. Very hot water, as hot as can be borne, is of use in capillary oozing. The actual cautery is sometimes employed to check hæmorrhage; it used to be largely used in bygone days before the ligature came into general use; its main application at the present time is in the oozing from the cut surface of bone.

Styptics (q.v.), of which perchloride or persulphate of iron are the best.

Acupressure (q.v.).

Torsion and Ligature, the end of the wounded vessel being seized with artery forceps and either twisted, or else secured by tying a ligature round it.

In all cases of serious bleeding the patient should be kept perfectly quiet, lying on the back; stimulants should be avoided, and only given under medical advice. When practicable the bleeding area may be raised, so as to secure the aid of gravity in opposing the blood flow.

Hæmorrhage from various internal organs will be discussed under the following heads:—Bleeding from the nose, *see* EPISTAXIS; from the lungs, *see* HÆMOPTYSIS; and from the stomach, *see*

HÆMATEMESIS; also *see* MELÆNA, PILES, MENORRHAGIA, HÆMATURIA.

Bleeding, Blood-letting. When a vein is opened, the process is termed venesection or phlebotomy; when an artery, arteriotomy. Other methods of abstracting blood are by means of leeches, or cupping, or the artificial leech.

Venesection was at one time in the history of medicine an everyday occurrence in medical practice; particularly was it deemed advisable to abstract blood in inflammations and fevers. In such conditions the blood often coagulates slowly, allowing a partial subsidence of the red blood corpuscles to occur, and there is consequently formed an upper almost colourless "buffy coat," or "*crusta phlogistica*," composed of white corpuscles entangled in fibrine. This condition of blood was held at one time to imperatively demand venesection. But blood-letting was in old days by no means confined to cases of this kind; it was considered right by some practitioners to bleed people as a matter of routine, whenever they were a little out of sorts; a man was bled before he made a mountain ascent, and so on. Cupping was a thriving profession, and leeches were used in such profusion as to make the leech trade quite an important industry. Nowadays, such are the changes of fashion, venesection is but rarely practised, and even the application of leeches is becoming a rarity. There can be little doubt that in avoiding the one extreme medical science has rushed into the other. Of the use of leeches in the relief of pain there can be no question, and venesection itself seems to be of undoubted service in certain cases of apoplexy and of engorgement of the right side of the heart.

In practising venesection the median basilic vein at the bend of the elbow is the vessel usually opened. The arm is allowed to hang down, the patient being sometimes directed to grasp a staff with the hand, while a handkerchief is tied round the arm just above the elbow to "make the veins stand out." The incision into the vessel requires to be made with caution, so as not to injure the underlying artery. After sufficient blood has been allowed to flow, a compress is applied and the arm bandaged up.

Bleek, FRIEDRICH, Biblical critic, was born in 1793 at Ahrensbök in Holstein. In 1818 he became a tutor at Berlin university and in 1823 a theological professor, which position he was appointed to at Bonn in 1829. His *Introduction to the Old Testament*, 1860, and *Introduction to the New Testament* are his chief works and those by which he is best known to English readers. He died in 1859.

Bleek, WILHELM HEINRICH IMMANUEL, philologist, son of the preceding, was born in 1827 at Berlin. He applied himself to the study of the languages of South Africa, and in 1855 accompanied Bishop Colenso thither. In 1860 he was appointed librarian of the Gray Library, Capetown, where he continued his philological investigations until his death in 1875. His chief works are *The Languages of Western and Southern Africa*, 1856, *Reynard the Fox in South Africa: Hottentot Fables and Tales*, 1864, *A Comparative Grammar of South African Languages*, 1862. He also began a *Bushman-English and English-Bushman Dictionary*, which was considered of such importance that after his death the Cape Colony Assembly appointed a successor to continue the work.

Blende, the name of which mineral signifies blind or deceptive, is known to English miners as "black-jack," and, though containing no lead, sometimes resembles galena, lead sulphide. Formerly considered worthless, blende, which is zinc sulphide (ZnS), is now the chief commercial ore of zinc. Iron and cadmium are often present in this ore, and the rare elements, lithium, indium, thallium and gallium, have been detected in it, especially in its darker varieties. Blende only fuses on thin edges alone, but decrepitates before the blowpipe. With carbonate of soda it gives a green flame, and when intensely heated it yields the white incrustation characteristic of zinc, that becomes green with cobalt nitrate. It dissolves in concentrated nitric acid, leaving the sulphur as a residue, and in hydrochloric acid with disengagement of sulphuretted hydrogen. This and its greater softness distinguishes it from tinstone, which it often resembles in its adamantine lustre and black and brown colour. Its hardness is between 3·5 and 4, and its specific gravity 3·9 to 4·2. It is very brittle. It may be colourless or white and transparent yellow, green, or red, but is more often opaque and dark. It crytsallises in tetrahedra and other forms in the cubic system; but may be fibrous or compact. It is abundant in Cornwall, Alston Moor, and elsewhere, associated with galena; at Ammeberg on Lake Wetter, in gneiss; in Asturias, with liquid enclosures; in Missouri; and in Franklin co., New Jersey, where the finest colourless crystals are found.

Blenheim, a Bavarian village on the Danube, is memorable through the famous battle in which Marlborough brilliantly defeated the French and Bavarians during the war of the Spanish succession, August 13th, 1704. Opposed to Marlborough, who had 52,000 men under him, was a force of 56,000 men. Of these last 40,000 were either killed or captured, while of the victors only 12,000 were killed or wounded. For this achievement the estate of Woodstock was conferred on Marlborough, £50,000 voted him to erect a family seat, and a perpetual pension of £4,000 per annum.

Blenheim Palace, the seat of the Duke of Marlborough, near Woodstock, Oxfordshire, was erected at the public expense during the time of Queen Anne, the architect being Sir John Vanbrugh, and the style Italo-Corinthian. In it were stored, amongst other celebrated pictures, *The Young St. Augustine and Pope Gregory*, by Titian; *Europa, Esther*, and *The Massacre of the Innocents*, by Veronese; Tintoretto's *St. Jerome*, Rembrandt's *Isaac Blessing Jacob*, etc., portraits by Rubens, Vandyck, etc. The collection was disposed of by auction in 1884, when Raphael's *Ansidei Madonna* was bought for the National Gallery at £70,000. The Titian Gallery was burnt down in 1859. The grounds of Blenheim cover an area of 2,700 acres, and are adorned with, amongst other things,

a pedesral 130 feet high, surmounted by a statue of the Duke of Marlborough. The plantations are said to represent the positions of the troops on the battlefield of Blenheim.

Blenheim Spaniel, a small variety of spaniel, differing from the King Charles in colour, which should be pure white, with orange or ruby markings. The dogs are named from Blenheim Park, where the breed was formerly in high repute, and are sometimes called Marlborough dogs from the title of the owners of that seat.

Blennorrhœa, a disease accompanied by profuse discharge from a mucous membrane. The term is not now often used, and when it is employed, is generally limited to mucous discharges from either the conjunctiva or the genito-urinary mucous membrane.

Blenny, any fish of the genus Blennius, often extended to the family (Blenniidæ) of which this genus is the type, and sometimes to the Blenniiform division of Acanthopterygian fishes (containing six families, having the body long, low, and compressed, very long dorsal fin, generally long anal fin, ventral fins, if present, on or under the throat). In the family the body is naked or covered with small scales; there may be one, two, or three dorsal fins occupying the whole back, and the ventral fins are under the throat, or rudimentary, or absent. There are numerous genera freely distributed in temperate and tropical seas; all are carnivorous, and the majority are small shore fishes, many living in brackish, and others in fresh, water. In some the ventral fins are reduced to mere stylets, and are used as locomotive organs, by means of which the fishes move along the bottom or among seaweed. The largest Blenny is *Anarrhichas lupus*, the sea-cat or sea-wolf; and to the family belong the Butter-fish (q.v.), and the Viviparous Blenny (*Zoarces viviparus*), and some other forms that extrude the young alive. Of the true Blennies (Blennius) there are some forty species, of which the following are British: *B. gattorugine*, some 12 in. long; *B. pholis* (the Smooth Blenny or Shanny), about 5 in. long, olive-green marked with black; and *B. oscillaris* (the Butterfly Blenny), about 3 in. long, with a black spot banded with white on the dorsal fin. In most of the species there is a tentacle over the eye.

Blessington, Margaret Power, Countess of, novelist, was born in 1799, at Knockbrit, Tipperary. Marrying first at the age of fourteen, she lived only three months with her husband, but on his death married in 1818 the Earl of Blessington. She became an intimate friend of Lord Byron, who addressed several poems to her, and alludes often to her charms in his *Diary and Letters*. On her husband's death in 1829 she became the mistress of a large fortune, and her house at Kensington Gate became the resort of men of distinction of every country. Amongst her writings are *The Idler in France*, *The Idler in Italy*, *Conversations with Lord Byron*, *Victims of Society*, *The Lottery of Life*, etc. She was also the editor of Heath's *Book of Beauty* and the *Keepsake*. She died in 1849, in Paris, whither she had fled with Count D'Orsay from creditors.

Bletchley, a junction of the London and North Western Railway, connecting the main line with Oxford and Cambridge.

Blewfields, or Bluefields, a river and town in the Mosquito territory, Nicaragua, Central America. The river has an easterly course of several hundred miles, and flows into the Caribbean Sea. The town is at its mouth, and has a good harbour.

Blicher, Steen Stensen, poet and novelist, was born in 1782 at Vium, a village of Viborg. His poems are national and vigorous, and his novels give vivid pictures of rural life in Jutland. He translated *Ossian* and *The Vicar of Wakefield*. He died in 1848 at Spendrup.

Blida, or Blidah, a fortified town in Algeria, in the Metidjah, and 30 miles inland from Algiers. It is situated in a flourishing district, where oranges are largely produced, and is the centre of a considerable trade.

Bligh, William, who was born about 1753, entered the Royal Navy and served under Captain Cook in 1772–74. As a lieutenant he was present in 1781 at Hyde Parker's action with the Dutch on the Dogger Bank, and in 1782 at Howe's relief of Gibraltar. He was appointed in 1787 to the command of the *Bounty* and directed to endeavour to introduce the bread fruit tree from the Pacific to the West Indies. In April, 1789, when the ship was not far from Otaheite, the greater part of the crew, led by Mr. Christian, mate, mutinied, and putting the officers and the rest of the hands into an open boat, set it adrift, with but little provisions and water and no fire-arms. Captain Bligh and his 17 companions made their way, after terrible sufferings, to Timor, which they reached on June 14th, and where they were hospitably received by the Dutch governor. Promoted in 1790 to be post-captain, Bligh commanded the *Director*, 64, at Duncan's victory off Camperdown, and the *Glatton*, 54, at Nelson's destruction of the Danish fleet at Copenhagen in 1801. In 1805 he was sent out as captain-general and governor of New South Wales, but he was so unpopular and arbitrary that after a stormy rule of about eighteen months he was forcibly deposed and sent home. He became a rear-admiral in 1811, and a vice-admiral in 1814, and died in 1817. He was an officer not devoid of merit, and certainly possessed both courage and resource, yet he betrayed a singular capacity for making himself disliked by his subordinates.

Blight, a term in popular use, signifying inflammation of the conjunctiva. [Conjunctivitis.]

Blight is the name applied to a number of plant diseases. The term is best restricted to those due to the attacks of large numbers of minute animals or fungi. Of the animal blights the most important in England are Aphidæ, or plant lice, which, owing to their enormous powers of reproduction, can do serious damage to any crops they attack; this group includes the *Phylloxera*, which

lives on the vine. Most of the orders of insects supply cases of blight: thus among the Diptera there is the genus *Cecidomya* (the corn midge and Hessian fly); among the Coleoptera, *Haltica*, the turnip fly; among the Hymenoptera, besides the *Aphidæ*, there are the *Cynipidæ* or gall flies; amongst the Lepidoptera various caterpillars swarm in such number as to be included in this category. Amongst other classes of animals that act as blights, there are the *Phytoptidæ*, a family of Acarina, which cause galls on plants; and some species of worms as *Anguillula tritici* which causes the "ear cockle" of wheat. Sultry weather is favourable to the development of insect pests, and thus the belief has arisen that the haziness of the air overladen with moisture is itself a blighting substance. The name points to a common effect of fungus growth, viz. the bleaching or yellowing of leaves by the destruction of their chlorophyll.

Blind, KARL, revolutionist and journalist, was born in 1826 at Mannheim. While still a student at Heidelberg and Bonn, he joined revolutionary societies, and in 1847 was imprisoned on account of a pamphlet he wrote, *German Hunger and German Princes*. He was again arrested in 1848 as a participant in the risings in South Germany at the time and sentenced to eight years' imprisonment, but was liberated by the populace. Ultimately he was forced to seek an asylum in England, where by his pen he continued to advocate the freedom and unity of the German people. He died in 1907.

Blind Fish, a popular name for any fish in which the eyes are rudimentary or absent. It is chiefly applied to the blind fish of the mammoth cave of Kentucky (*Amblyopsis spelæus*), which occurs also in the subterranean rivers of the central portion of the United States. It is about 5 inches long, quite colourless, and destitute of external eyes. Forms without ventral fins have been made a distinct genus (Typhlichthys) Chologaster, an allied form, with small external eyes, has been recorded from a rice field in South Carolina. In *Lucifuga dentata*, from the subterranean waters of caverns in Cuba, the eye is absent or quite rudimentary. [DEGENERATION, ENVIRONMENT.]

Blindness. In Great Britain one of every 1,100 to 1,200 persons is blind, and thus in England and Wales there are some 30,000 blind people. The advances which have been made in ophthalmic surgery have considerably lessened the number of cases of loss of sight occurring in the course of a year, and this improvement has been specially marked within quite recent times. Still much remains to be done; too many people are still to be seen whose blindness is due to causes which might have been prevented had the mischief been dealt with in time.

Perhaps the most important of the preventable causes of blindness is the ophthalmia of infants. The neglect of inflammation of the eyes in the newborn child too often leads to blindness; and yet if the necessity for careful treatment be recognised from the very commencement of the affection, no impairment of vision should result. Neglect and want of cleanliness can work in this disease a life-long mischief, in the course of a few hours.

Sympathetic ophthalmia is another form of ocular disease which used to be accountable for many cases of blindness. An injury of one eye may set up "sympathetic" inflammation, as it is called, in the other, and so lead to loss of sight in both. In the case of so important an organ as the eye, the advisability of at once seeking competent advice, even in what may appear a trivial affection, cannot be too strongly insisted upon.

Fortunately the dense corneal opacities so often seen in former years as the result of smallpox are now quite a rare phenomenon. Glaucoma still claims a certain though a reduced number of victims. Sight is not often actually lost, but in an enormous number of cases it is considerably impaired, by the neglect on the part of parents to recognise the fact that their children require a pair of glasses. Reiterated complaints of headache in a child should always cause suspicion to fall upon the eyes; and again, the fact that a child holds its head close to its book and has indifferent vision for distant objects should be held to demand prompt attention. If the evil be recognised, it is most important to obtain the right glasses and not be content with a rough and ready trial. Skilled advice should be obtained at the outset, and on no account should a child be allowed to run the risk attendant upon wearing a pair of spectacles simply because they appear to suit the eyes.

The education of the blind received much attention during the nineteenth century. M. Haüy conceived the idea in 1784 of enabling blind people to read by passing the finger over letters raised in relief. Many forms of type have been tried, among which may be mentioned those of Frere, Lucas, and Moon. The last named form is in most general use. Blind people are taught various trades, especially those of rope, brush, broom, and basket making. Pianoforte tuning has been suggested as an employment for the blind, and found eminently satisfactory. For information on these subjects see *Education and Employment of the Blind*, by Dr. Armitage.

Blindness, COLOUR. [COLOUR BLINDNESS.]

Blind Worm (*Anguis fragilis*), a limbless lizard of the family Scincidæ [SKINK], without external limbs, occurring in Great Britain, distributed over Europe except in the extreme north and in Sardinia, and found also in Africa and Western Asia. It is usually from 10 inches to 14 inches long (though larger specimens are recorded), of nearly uniform thickness throughout, but with a slight taper towards the tail. The colour is brownish-grey, with a silvery lustre, and there is a black line down the centre of the back. The popular name is misleading, for the small, bright eyes are distinctly visible. These reptiles are shy and timid, passing the day in their holes and coming out at night to feed on worms, insects, and small slugs. Country people consider them venomous, but as they have no poison-fangs their bite is innocuous, and their teeth are too small to draw blood. Blind worms are easily frightened,

and then contract their muscles so forcibly as to render the body rigid, and in this condition they are easily broken in two by a slight blow, or by an attempt to bend it. Some writers say that "a sudden fright is sufficient. While you are looking at the tail wriggling and jumping about, the body quietly makes its escape." The females are ovoviviparous, and the young—from seven to twelve or more in number—are generally born in the summer. These animals pass the winter in a torpid condition, several of them occupying one hole. [CÆCILIA.] The name Slow-worm is generally said to refer to its tardy motion; it is really from *A.S. slá wyrm*, the slay-worm, and embodies the old belief in its poisonous character.

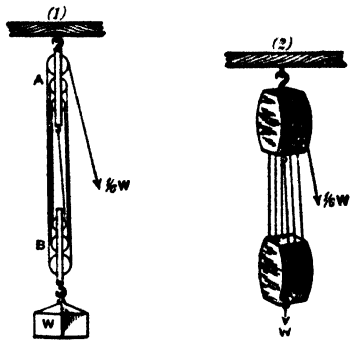
Blistering. Blister. Certain irritant substances are employed in medical practice to set up inflammation of the skin overlying diseased organs or in the neighbourhood of diseased parts. As the result of such irritation, a blister, *i.e.* an accumulation of serous fluid beneath the cuticle, is produced. Thus in inflammations of deep seated organs, as, for example, the lungs, it is sometimes deemed advisable to apply blistering agents to the skin of the chest. Again in neuralgias, in certain eye affections, and in joint troubles, blisters are often used. The exact cause of the beneficial actions of the counter irritation produced by blistering is obscure; certain it is that blisters do relieve pain and hasten the cure of some inflammatory affections. They must not, however, be indiscriminately employed, and are peculiarly unsuitable in the case of children. The blistering ointment and blistering fluid of the British pharmacopœia are preparations made from the Spanish fly (*Cantharis vesicatoria*).

Blizzard, a gale or storm accompanied by great cold, and fine, driving snow. It is common in America, where it not infrequently proves fatal to many men and beasts. In 1888 the severest yet recorded visited Texas and Dakota and caused great destruction of life.

Bloch, MARCUS ELIEZER, naturalist, was born in 1723 at Anspach, Bavaria. He is known from his ichthyological treatise, *Allgemeine Naturgeschichte der Fische* (1782–95). He died in 1799 at Berlin, where he had practised as a medical man.

Blockade, the attempted prevention, by a fleet or squadron, lying off a town or a length of coast, of the ingress and egress of shipping. In order to be internationally recognised, a blockade must be effective. Otherwise, in accordance with the terms of the Declaration of Paris, it is not to be respected by neutrals. In any event it must be officially notified to neutral powers. It is generally believed that an effective blockade will in the future be difficult if not impossible to maintain, save by means of overwhelming forces.

Block and Tackle, an arrangement of pulleys for the purpose of lifting heavy weights. It is an example of the so-called *mechanical powers*, in which extra force is obtained at the expense of speed. In the example shown we have two *blocks* A and B, each holding three pulleys. A rope is fixed at one end to the upper block, and passes round the pulleys in the lower and upper blocks alternately till the last pulley is used, and the rope passes to the hand of the operator. The weight is hooked



BLOCK AND TACKLE.

on to the lower block, and in the case shown will be supported by ⅙ W, since there are six cords supporting it and each cord sustains ⅙ W. For the tension produced by the pull of the operator is transmitted throughout the cord. The second figure shows the arrangement generally adopted, the same in principle and in action, but more compact.

Block-house System, a method adopted in the Boer War (1902), by means of which the country in which the war was waged, was mapped out into districts, and block-houses, or military stations, erected at stated intervals. The system met with some success, but did not have the effect of immediately terminating hostilities.

Block-printing, the art of printing from blocks of wood instead of from movable type. It is said to have originated in China about the sixth century. Block-printing is now chiefly used in calico printing and printing of paper-hangings.

Blocks. A block is a pulley, or system of pulleys, mounted in a frame. A block consists of the shell or frame; the sheave or wheel on which the rope runs; the pin or axle on which the sheave turns; and the strap or part by which the block is made fast to any particular station. This last is of either rope or iron, the other parts may be of either iron or wood. A single block contains but one sheave; a double block has two sheaves, one above and one below.

Block System, a method of working trains on a railway to ensure that a definite distance exists between consecutive trains. The line is divided into sections, and no train is allowed to enter on any single section till the train in front has left it. The signals are worked by telegraph at each end of each section. [RAILWAYS.] On *Electric Railways*, worked by conductor methods, an automatic block system is possible. The existence of a train on one section of the line may be made to prevent any motive power being transmitted to another train on the same section, and so may render any nearer

approach impossible till the first has passed off. [ELECTRIC RAILWAYS.]

Bloemfontein, capital of the Orange River Colony (formerly Orange Free State). It is 200 miles W. by N. of Durban. It does a considerable trade, chiefly in wool, and is connected by rail with Capetown, Johannesburg, and Natal. During the war it was occupied by the British.

Blois (anc. *Blesa*), the capital of the department of Loir-et-Cher, France, is prettily situated on the right bank of the Loire, 35 miles S. of Orléans, and communicates by a bridge with the suburb of Vienne on the opposite side. Blois is not known in history before the 6th century of our era. Until 1391 it was the centre of a county, but, being bought by Louis XII., became a favourite residence of Francis I., Charles IX., and Henry III. The castle, a splendid structure recently restored in good taste, dates from the 13th century with many subsequent additions. The hôtel de ville, the old episcopal palace, now the prefecture, the churches of St. Vincent and St. Nicholas, and the modern cathedral of St. Louis possess features of interest. Water is still supplied by an aqueduct cut in the solid rock by the Romans. The town is the seat of an archbishopric, and has the law courts, colleges, schools, and other institutions of a provincial capital, and a large garrison is maintained there. Many ancient houses remain in the streets that climb by steps from the Loire. The chief manufactures are pottery, gloves, and hosiery. A large trade is carried on in corn, wine, brandy, timber, and agricultural products.

Blomefield, FRANCIS, was born at Fersfield, Norfolk, in 1705, and taking holy orders, became rector of his native place, and afterwards of Brockdish. The work of his life was the compilation of his *History of Norfolk*, in which he gathered together an enormous quantity of material, though it is not always accurate or well-digested. In the course of his inquiries he discovered the *Paston Letters* (q.v.), part of which he published, but died in 1752 before completing his task.

Blomfield, CHARLES JAMES, D.D., was born at Bury St. Edmunds in 1786, and distinguished himself at Trinity College, Cambridge, where he held a fellowship. He edited several plays of Æschylus, the poems of Callimachus, and the literary remains of Porson. In 1819 he became rector of St. Botolph's, Bishopsgate, and in 1824 was made Bishop of Chester, being translated to the see of London in 1828. He resigned in 1856, and died in the following year. His exertions were devoted chiefly to the extension of the Church at home and in the Colonies. He also took a strong part in the religious controversies that began to stir the nation in his day.

Blommaert, or BLOEMAERT, the name of a Flemish family distinguished in the arts of painting and engraving. ABRAHAM BLOMMAERT flourished as a landscape painter from 1565 to 1647. His son CORNELIUS established himself in Paris in 1630, and executed the plates for Marolle's *Temple des Muses*, besides several fine reproductions of works of A. Carracci and Rubens. He established a school of French engravers.

Blommaert, PHILIPPE, born at Ghent in 1809, spent most of his life in collecting the fast decaying fragments of popular Flemish poetry. He translated the *Nibelungen Lied* into the language of his country, and wrote a valuable *History of the Belgians*, in which he advocated the distinct nationality of his native country. He died in 1871.

Blondel, the famous troubadour of the 11th century, was born at Nesle in Picardy, and attached himself to the service of Richard I. of England, whom he followed in his various expeditions. The story of the minstrel's discovery of his master by singing outside the prison into which the latter had been thrown by Leopold of Austria belongs to historical fiction, and is first found in the *Chronicles of Rheims*, no earlier than the 13th century. Several songs attributed to this personage are extant, but some critics believe that Robert Blondel, the chaplain to Marie d'Anjou (1400-1461), was really their author.

Blondel, DAVID, was born at Châlons-sur-Marne in 1591, and entered the Protestant ministry. He was appointed historiographer to the French king, and afterwards became the successor of Vossius as professor at Amsterdam. He is best known for his exposure of the myth of Pope Joan.

Blondin, CHARLES (whose real name was EMILE GRAVELET), was born at St. Omer, France, in 1824, and made his *début* as an acrobat and rope-dancer at Lyons. He next went over to America, where his skill and courage were highly appreciated. In 1859 he undertook to cross on a tight rope the Falls of Niagara, and performed the feat before a huge crowd. He subsequently crossed blindfold, and again on stilts, and he also carried a man over upon his back. The Prince of Wales (afterwards Edward VII.) witnessed his exploit, but declined his offer to be wheeled over in a barrow. Blondin visited England and the principal cities of Europe, and having lost the fortune he had acquired, performed in his old age. He died in 1897.

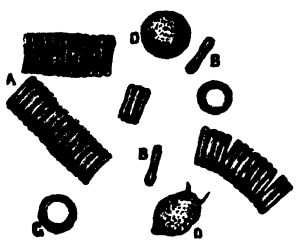
Blondin, PETER, born in Picard in 1682, became a pupil of Tournefort, the botanist, and received the curatorship of the Royal Gardens in Paris. He left valuable collections at his death in 1713.

Blood, the viscid red fluid which circulates through the heart, arteries, capillaries, and veins of the body. It ministers to the wants of the several animal tissues, which all draw upon it according to their needs; it takes up oxygen from the lungs and nutrient materials from the capillaries of the alimentary canal, and it receives the contents of the thoracic duct (q.v.) and the lymph of the right lymphatic duct. Again, from the blood the secreting glands elaborate their several secretions, and the kidney, lungs, and cutaneous glands remove certain excretory substances. Thus each portion of the animal body takes up nutrient material from the blood and discharges waste products into it, and the maintenance of the circulation ensures the distribution of suitable nourishment to all the

tissues, and the final elimination from the body of such substances as are of no further use in the animal economy. In spite of this continual interchange of such varied materials between the blood and the tissues the composition of the blood remains singularly uniform. In the matter of oxygen, it is true, there is a noticeable difference. The bright red arterial blood coming from the lungs is in striking contrast to the bluish red venous blood which has given up a part of its oxygen to the tissues. But while the carrying of oxygen forms the most obvious and most important function of the blood, it must not be forgotten that the debtor and creditor account of the circulating fluid is concerned with innumerable other substances; and it is not a little remarkable that the chemical composition of the blood should remain so constant in spite of variations in diet, climate, habit of life, and other external conditions. It must be borne in mind that blood is not the only fluid which circulates in vessels within animal bodies. The lymph (q.v.) also plays an important part in transferring the products of tissue change from place to place. The lower we descend in the animal scale the more insignificant becomes the part played by circulating fluids; and, indeed, among invertebrates there are but few types in which there exists a fluid corresponding to the blood of backboned animals. In all the vertebrata, however, a circulating medium exists which is made up of two parts: first, the plasma or liquor sanguinis, and secondly, the blood corpuscles. The *plasma* is well-nigh colourless; it is a faintly alkaline fluid containing certain albuminous substances, fats, extractive bodies, and mineral salts. The corpuscles are of two kinds, the red corpuscles and the white corpuscles or leucocytes. The former are much more numerous than the latter; roughly speaking, about 400 red corpuscles are found for every white corpuscle in human blood, but this ratio is by no means a constant one; considerable deviations from it are met with at times in healthy persons. After a meal, in particular, the white corpuscles are found to be present in greater numbers. When, however, the leucocytes are so numerous as to nearly equal in quantity the red corpuscles present, the blood is diseased, and is said to be leucocythæmic. [LEUCOCYTHÆMIA.]

It has been estimated that a cubic millimetre of human blood contains on an average 5,000,000 red corpuscles. In anæmia (q.v.) the number present is much less than this. The red corpuscle of human blood is a circular, biconclave disc measuring $\frac{1}{3200}$ to $\frac{1}{3500}$ in. in diameter and about $\frac{1}{12500}$ in. in thickness. It is made up of a colourless elastic framework or stroma, the substance of which is infiltrated with the remarkable colouring matter called hæmoglobin (q.v.). An individual corpuscle seen under the microscope is of a pale yellowish or straw colour; when, however, light passes through plasma containing large numbers of corpuscles, *i.e.* when several layers of these pale yellow bodies are traversed by the light before it reaches the eye, the deep red colour which we ordinarily associate with blood appears. It is noteworthy that the limitation of the hæmoglobin to the stroma of the blood corpuscles explains the opacity of blood. For the light is scattered by the multitude of minute coloured bodies which lie in the colourless plasma. If the hæmoglobin be diffused uniformly throughout the substance of the blood, instead of remaining confined to the corpuscles, a much more transparent fluid results. Blood in which this change has been effected is called "laky." Shaking with alcohol or ether and alternate freezing and thawing reduce blood to this "laky" condition.

The human red corpuscle possesses no nucleus. Speaking generally of the five groups into which backboned animals are divided, four, viz. fish, reptiles, amphibia, and birds, have nucleated red corpuscles; in the highest group, mammals, no nucleus is present. Moreover, while in mammals, with the exception of the camel tribe, the red corpuscles are circular, in the other four groups they are oval discs. In a drop of blood viewed under the microscope the coloured corpuscles usually adhere together, like coins piled one on another, in little heaps, which are called rouleaux. The addition of saline solution to human blood makes the discs swell up, producing the horse chestnut-shaped or "crenate" condition.



HUMAN BLOOD.

A. Rouleaux of red corpuscles.
B. Red corpuscle seen in profile.
C. Red corpuscle seen from its broad surface.
D. White corpuscles.

Red corpuscles are formed in the red marrow of bones, and perhaps in the liver and spleen; their term of existence is a limited one; after a time they are destroyed, mainly, it is supposed, in the spleen.

The white corpuscle is a nucleated cell; its protoplasm is possessed of that form of mobility which is known as "amœboid" [AMŒBA], and its shape is consequently continually changing. In size it is a little larger, as a rule, than a red corpuscle.

The great constituent of the coloured corpuscles is hæmoglobin (q.v.), and their chief function is to carry oxygen. The functions of the white corpuscles are less clearly understood; probably they play an important part in coagulation, and their number is largely increased in inflammatory conditions; indeed, many theories have been put forward with respect to the influence of leucocytes in disease processes. [INFLAMMATION, PUS, PHAGOCYTOSIS.]

Coagulation. Living blood, it has been said, consists of plasma and corpuscles; on removal from the body, however, an important change occurs in it. A new body, fibrin, appears as a network of delicate fibres, which entangle the corpuscles and hold them as in a meshwork; and thus a jelly-like, semi-solid substance is formed, the crassamentum or clot, and the blood is said to have coagulated. The fluid in which the clot floats is called serum; thus while living blood consists of plasma and corpuscles,

clotted blood is made up of serum and clot. This coagulation is of the first importance in the prevention of bleeding from injured vessels; were it not for this remarkable phenomenon the slightest scratch or surface abrasion would be attended with most serious consequences. Again, clot formation plays a part in certain diseases. [PHLEBITIS, ANEURISM.] Many attempts have been made to explain how coagulation comes about. The modern view is that there exists in the plasma a complex substance allied to albumen, which is the antecedent of the fibrin, and that under certain circumstances this fibrin generator, "fibrinogen," as it is called, is converted by the agency of another substance, the fibrin ferment, into fibrin. Coagulation may be delayed by cold, by exclusion of air, by contact with living tissues, by addition of solutions of neutral salts, and by introducing certain substances into the circulation before the blood is shed. It is hastened by access of air, moderate warmth, and contact with foreign substances.

Tests for blood. (i) Microscopic examination of suspected fluids with a view to detecting the presence of corpuscles. (ii) Guaiacum reaction. A few drops of freshly prepared tincture of guaiacum are shaken up with the solution to be tested, and some ozonic ether added; the latter floats at the top, and at the line of junction of the lighter and heavier fluids a blue ring appears if blood be present. (iii) Formation of hæmin crystals. [HÆMIN.] (iv) Spectroscopic test. [BLOOD STAINS.]

Blood, THOMAS, Colonel, was born in Ireland in 1628. Entering the Parliamentary army, he served under Cromwell, and was appointed a justice of the peace in Ireland by the Protector's son. A needy, reckless, unprincipled adventurer, he turned Royalist at the Revolution. He twice attempted (1663 and 1670) to seize and assassinate the Duke of Ormond, Viceroy of Ireland, and escaped punishment. In 1671, dressed as a priest, he gained admission to the Tower, and nearly succeeded in carrying off the Crown jewels. He was brought before Charles II., and boldly admitted his guilt, and confessed that he had even formed a design against the king's life, but had been overawed by the royal presence. He was pardoned, and received a pension of £500 a year. After the fall of the Cabal ministry his influence waned, and he was sent to the King's Bench on a charge of conspiracy. He died in 1680 after being released on bail.

Blood Bird (*Myzomela sanguinolenta*), an Australian honey-eater (q.v.), named from the rich scarlet plumage of the male.

Blood Covenant, a covenant cemented by blood, in very many cases by the sacrifice of a victim. One of its most widely known forms is the rite of blood-brotherhood, mentioned by Herodotus (iv. 70), in which two persons actually mix their blood as a sign of lasting peace or friendship, and this rite is supposed to constitute real relationship between them. Accounts of such a ceremony are frequent in narratives of African exploration.

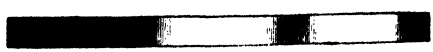
Blood Feud, a primitive system of rude justice by which every member of a stock or clan is bound to avenge personal injury done to anyone connected with him by blood-relationship. The vendetta (q.v.) is a particular case of the blood-feud.

Bloodhound, a large variety of hunting dog, the original stock from which the staghound, foxhound, harrier, beagle and other hounds have been obtained, and probably identical, or nearly so, with the old Southern Hound or Talbot; called also the Sleuth-hound (from Icelandic *slóth*; the mediæval English word survives as slot = the track of a deer). This dog stands about 28 inches high at the shoulder, but some breeders put the standard rather higher; the head is dome-shaped and noble; ears large, soft, and pendulous, long enough to meet in front of the square jowl; flews well-developed; nose broad, soft, and moist. The eyes are lustrous and soft, and the "haw," or nictitating membrane, is visible. The colour should be a uniform reddish tan, with a black saddle, becoming lighter on the lower parts and extremities; any admixture of white is generally considered to be a defect. The bloodhound is remarkable for its keen scent and its pertinacity in following up a trail. It is now scarcely ever used for hunting (though the late Lord Wolverton kept a pack), but is sometimes used to single out deer. Great caution, however, is required in the operation, as this dog can with difficulty be prevented from satisfying its desire for blood, when the opportunity presents itself. Bloodhounds were formerly kept for the pursuit of thieves, especially sheep-stealers; and trials have been made recently with a view to their employment in tracking murderers. The Cuban bloodhound, the descendant of mastiffs with a bulldog cross, was kept for tracking felons and fugitive slaves. It was proposed to use these dogs against the Marooners in Jamaica in 1796, but the dread they inspired rendered their employment unnecessary.

Blood-money, the price paid for bringing about the death of another, as by giving testimony such as will lead to his condemnation.

Blood Poisoning, a term applied in popular usage in a very indiscriminate manner. [PYÆMIA.]

Blood Stains. In criminal trials it is sometimes a matter of importance to determine the exact nature of stains on clothing, knives, etc., and in particular to ascertain whether the discoloration in question is a blood stain. In investigations of



SPECTRUM OF OXY-HÆMOGLOBIN.

this kind the ordinary tests for blood [BLOOD] are employed. A microscopical examination is made, the guaiacum test applied, and an attempt made to obtain hæmin crystals. Perhaps the most valuable means of diagnosis at disposal, however, is afforded by the spectroscope. The spectrum of oxyhæmoglobin when examined in appropriately dilute solution, presents two absorption bands—a narrower band in the yellow part of the spectrum and a broader one

in the green. On shaking up the solution with a reducing agent, such as sulphide of ammonium, the two bands become replaced by a single band in the yellowish-green. This test for blood is an extremely delicate one.

Various stains may be confused with blood stains, *e.g.* certain red dyes and iron rust; none of these, however, give the characteristic reactions of blood when examined spectroscopically. It must of course be remembered that the blood of any vertebrate animal will give the hæmoglobin spectra, and it is, as a rule, impossible to say to what species of animal the blood originally belonged.

Blood-stone, or HELIOTROPE, a variety of quartz, crypto-crystalline in texture and dark green in colour, with small spots of red jasper scattered through it, so as to resemble drops of blood. The name heliotrope, applied to a somewhat different stone, is explained by Pliny as due to the stone giving a red reflection of the sun's light when thrown into water. Blood-stone is found in the Isle of Rum, in Kintyre, and in the Deccan. It is chiefly used for signet-rings.

Blood-vessels. [BLOOD.]

Bloodworm, the red worm, like the larva of *Chironomus plumosus*, one of the gnats; it is common in ponds.

Bloomfield, ROBERT, the son of a village tailor, was born at Honington, Suffolk, in 1766, and was brought up first as a farm labourer, being afterwards (1781) apprenticed to a shoemaker in London. His latent poetical genius was stirred by reading Thomson's *Seasons*, and two of his compositions found a place in the *London Magazine*. He now devoted some years of labour to a more ambitious effort, and it was not until 1798 that his masterpiece, *The Farmer's Boy*, was completed. It was printed in 1800 at the expense of Mr. Capel Lofft, and had a large sale, being translated, too, into French and Italian. Bloomfield, after the custom of the times, obtained a small post in the Seal Office, but had to resign it on account of ill-health. His later poems, except *Wild Flowers*, did not win popular favour, and he sank into great poverty, dying of brain disease at Shefford, Bedfordshire, in 1823.

Bloomington. 1. The capital of Monroe county, Indiana, U.S.A., is situated 46 miles S.W. of Indianapolis. It is unimportant, save as being the seat of the university of Indiana.

2. The capital of M'Lean county, Illinois, U.S.A., 125 miles S.S.W. of Chicago; is an important railway centre, and has large works and also coal-mines. Educationally it, too, is a place of importance, containing a Wesleyan university, the Normal university of Illinois, a Roman Catholic academy, and a women's college.

Blount, CHARLES. [MOUNTJOY.]

Blount, CHARLES, the younger son of Sir Henry Blount, was born at Holloway in 1654. He dabbled in politics, but such fame as he possesses rests on his books attacking revealed religion. *Anima Mundi*, *Life of Apollonius Tyaneus*, and *Great is Diana of the Ephesians*, were the chief of these publications. His pamphlet basing the claim of William III. on right of conquest was burned by the hangman. Wishing to marry his deceased wife's sister, he wrote rather an able letter on that question, but, failing to procure an alteration of the law, committed suicide in 1698.

Blouse, a loose upper garment, generally blue, made of linen or cotton, worn by the working-men of France.

Blow, in *Dynamics*, means the sudden change of motion given to a body by the impact of another, of a mallet on a chisel for example. It is measured by the total momentum produced, and the effect is equivalent to that of a large force acting for a very brief interval. The average force during the blow is found by dividing the momentum produced by the short interval of time during which the impact lasts. The duration of the blow depends on the shape, mass, and material of the two bodies.

Blow, JOHN, Mus.Doc., was born at Cottingham, Notts, in 1648. An early promise of musical ability led to his being included amongst the first batch of "children of the Royal chapels," and at the age of twenty-one he became organist of Westminster Abbey, resigning in 1680 in favour of Purcell. In 1685 he was appointed composer to the king, and held various other appointments. On the death of Purcell he resumed his office at the Abbey. He published a collection of his compositions under the title *Amphion Anglicus* in 1700, and died in 1708 Though decried by Burney, many of his anthems hymns, and songs show considerable talent.

Blowfly, the popular name for two species of Diptera. *Calliphora erythrocephala* is the commonest species; it is also known as the "blue-bottle."

Blowing Machine is the general term for any force-pump arrangement to produce a current of gas. The chief types of blowing machines are on the principle of the common bellows, the ordinary pump, the fan, or the injector. In the ordinary *bellows* a flexible-sided chamber is made of wood and leather, and is provided with a nozzle, a flap-valve, and a handle or lever to enlarge and diminish the cavity alternately. When the cavity is enlarged, the flap-valve opens and air rushes in; when the air is compressed, it closes the flap-valve and is forced out at the nozzle. Thus a succession of intermittent puffs is given. The employment of two air-chambers in the *double bellows* enables us to obtain a continuous blast instead of the series of puffs. Blowing machines on the *pump* principle are much used in blast-furnaces and in the Bessemer process. They consist essentially of an air cylinder and a large air-chamber. In the former a piston is worked backwards and forwards by a separate steam-engine, and alternately draws air into the cylinder and forces it into the air-chamber, whose function is to act as an accumulator and ensure a steady blast. From this the air passes out by pipes to the furnace or to the converter, at a pressure of from 3 to 30 lbs. per square inch. In the *fan*, which is much adopted for the ventilation of mines, ships and public buildings, for forge fires and for the melting

of pig-iron, we have a wheel supplied with vanes, rotating inside a cylindrical chest at a speed of from 600 to 2,000 revolutions per minute. Air is drawn in at the centre of each face of the chest, and is forced out tangentially through a suitable exit-pipe. The fan is analogous in principle to the centrifugal pump. The *trompe* is a blowing machine on the *injector* principle (q.v.) employed in France, Spain and America, where a head of water is available. Water flows out from a cistern through a nozzle at the bottom, and then into a vertical pipe of somewhat larger dimensions. Air is drawn into the pipe at the nozzle by the flowing water; it is carried down to a cistern below, and is forced out at a suitable orifice.

Roots's *rotary blower* has a chamber in which two solid pieces rotate together in such a way as to make always a close fit with each other and with the sides of the chamber. A volume of air is drawn in on one side of the rotating pieces during part of a revolution, and is forced out at the other side during the rest of the revolution.

Blowpipe, an instrument used for directing a blast of air into a flame. A convenient form of mouth blowpipe consists of a tube, fitted at one end with a mouthpiece, and inserted at the other into a small metal cylinder, from the side of which issues, at right angles, a short tube with a brass or platinum nozzle. To use the blowpipe well, considerable practice is required. A continuous blast is needed, and for this the cheeks should be kept distended all the time, respiration being performed through the nose. By regulating the flame, and the blast, an oxidising or reducing flame can be produced at will. It is largely used in qualitative chemical analysis, and for fusions and glass-blowing. For this latter purpose some of the different forms of foot blowpipes are employed.

Blücher, Gebhard Leberecht Von, Field Marshal and Prince of Wahlstadt, was born at Rostock in 1742, and at the age of fourteen enlisted in the Swedish service. He was taken prisoner by the Prussians and induced to join their ranks. Disgusted at not getting promotion he retired for fifteen years to his estates in Silesia, and only returned to his regiment on the death of Frederick the Great. He now speedily earned distinction by his gallant conduct in the campaigns of 1793-94; and in 1802 he took Erfurt and Muhlhausen. After the disaster at Jena he led a masterly retreat to Lubeck, where he was captured after a bloody and obstinate fight. Having been exchanged for General Victor, he again resumed his duties in the field, and was actively employed in Pomerania until the peace of Tilsit. Napoleon's influence led to his temporary retirement, but when Prussia took up arms again in 1813 he was recalled, and in spite of his age displayed great vigour at Lutzen, Bautzen, Katzbach, and Mackern, playing moreover a conspicuous part in the final victory at Leipzig, where he received his *bâton* as Field Marshal. In 1814 he entered France at the head of the Silesian army, and after successful engagements at Nancy, La Rothière, and Laon, he entered Paris, and would have sacked the city but for Wellington's intervention. "Marshal Vorwärts," as he was now nicknamed, received every honour that could be bestowed upon him, and the Iron Cross was instituted for his special distinction. He visited England during the brief spell of peace, and is said to have exclaimed in admiration, on seeing London, "What a place to sack!" In 1815 he was once more called from his Silesian farm to command the Prussian army in the Waterloo campaign. Defeated after a stubborn fight at Ligny, "the old devil," as Napoleon called him, narrowly escaped with his life, but arrived forty-eight hours later in time to put a finishing stroke to Wellington's great victory. Once more he marched as a conqueror to Paris, where he remained for several months. He died in 1819 at Kublowitz. Blücher is said to have been absolutely ignorant of the science of war, and to have been intellectually incapable of forming or criticising any strategical plan, but his courage, tenacity, and activity made him a very useful commander under the control of skilled advisers.

Blue. [Pigments.]

Bluebeard, whose edifying history as a stern corrector of conjugal indiscretion has been so useful in guiding children to a perception of moral truth, first appears in his familiar shape as the Chevalier Raoul in Perrault's *Contes de Fées* (1697). Some have supposed that Henry VIII. or the infamous Gilles de Retz, of Machecoul in Brittany, suggested the leading features of the narrative, but probably it is to be traced to a more remote antiquity in the folk-lore that has been inherited by all races from a primitive age. The tale under various guises appears in Greek, Italian, French, Gaelic, Basque, and several Scandinavian languages, the entry of a forbidden room being a common feature in all cases. Bluebeard has for a century at least been a household word throughout Europe, and his adventures have supplied matter for numberless burlesques, as well as for Grétry's Opera of *Raoul* and Tieck's *Phantasus*.

Blue-bell, the popular name in England of the wild hyacinth (*Scilla nutans*), and in Scotland of the hare-bell or round-leaved bell-flower (*Campanula rotundifolia*).

Blue-bird, any bird of the American genus Sialis. The species, named from the general colour of their plumage, are about the size of robins, and are as great favourites with the Americans as robins are in Britain. The adult male of *S. sialis*, the Eastern blue-bird, from the eastern States of North America, is rather more than 6 in. long; azure blue above, reddish brown beneath, belly and under tail-coverts white. *S. mexicana*, the Californian blue-bird, ranging from the Rocky Mountains to the Pacific, is slightly smaller, bright azure blue above, with more or less chestnut on the back, sides dark reddish-brown, rest of under-surface pale bluish. *S. artica*, the Rocky Mountain blue-bird, is the smallest species; greenish-azure with white belly. The females are duller in colour than the males; the young are spotted and streaked with white. These birds feed on small beetles and the larvæ of the smaller butterflies and moths.

Blue-book, a book containing statistical returns, reports of Parliamentary commissions, Acts of Parliament, etc. So called because many papers published by order of Parliament are bound in blue covers.

Blue-bottle Fly. [BLOWFLY.]

Bluecoat School, the name generally given to Christ's Hospital school, Horsham, founded in the reign of Edward VI. The scholars wear a distinctive dress, consisting of a long dark-blue coat, a leather girdle, knee-breeches, and yellow stockings. They generally wear no caps at all.

Blue-eye, the colonial name of *Entomyza cyanotis*, sometimes called the Blue-faced Honey Eater. This bird seems to be confined to New South Wales; it is found almost exclusively among the blue-gum trees, and feeds on insects and honey. Head and back of neck black; bare space round the eye rich deep blue; upper surface golden olive, under-surface white. The blue-eye often resorts to the deserted nests of an allied species to deposit its eggs. The cry is loud and monotonous. [HONEY-EATER.]

Blue-fish, the American name of *Temnodon saltator*, a fish allied to the Horse-mackerel, distributed over nearly all tropical and sub-tropical seas. It is abundant on the shores of the United States, where it is highly valued for the sport it affords, and as a food fish. It is carnivorous, and exceedingly rapacious, destroying many more fish than it can devour. Specimens of 5 feet in length are recorded, but the majority caught are not half that length. Called also Skip-jack.

Blue-gown, a pensioner, who formerly, in Scotland, used to receive on the king's birthday a blue gown, a purse with a certain sum of money in it, and a badge. They were also known as the *king's bedesmen*. The practice of appointing blue-gowns was done away with in 1833.

Blue Gum (*Eucalyptus globulus*), one of the most valuable and best-known species of a large genus of myrtaceous trees, most of which are natives of Australia. It was discovered by Labillardière in Tasmania, in 1792, but was not grown in Europe until 1861. In its native country it reaches 400 or 500 feet in height and more than 80 feet in circumference, and its growth is wonderfully rapid, trees eleven years old reaching 60 feet in height and 8½ feet in girth. As fuel, it has yielded a net annual profit of over £4 per acre. Its wood when mature takes a good polish, is hard, durable and nearly equal to oak. Its leaves are glaucous and turn edgewise, so that it gives but little shade. When rubbed these leaves are aromatic, and by distillation an essential oil is obtained from them which is largely employed for diluting attar of roses, and for scenting soaps. By its rapid growth this tree is certainly useful in draining pestilential swamps, for which purpose it has been employed in Italy, and its perfume and an alcoholic extract of the leaves are believed to be remedies for intermittent fever. The Blue Gum cannot withstand the frosts of northern Europe.

Blue Jay (*Cyanura cristata*), a North American jay, about twelve inches long, shades of blue above, wings and tail banded with black, and tipped with white; white beneath, tinged with blue on the throat and brown on the sides; a black crescent on the breast passing round to the back of the neck. These birds are omnivorous, preferring animal food, and repaying the farmer for the fruit and grain they eat by the quantities of caterpillars they devour. In mimicry the Blue Jay is scarcely surpassed by the mocking-bird (q.v.).

Blue-john, a common name for Fluor Spar (CaF_2), which is found to a large extent in Derbyshire. Used for ornamental purposes.

Blue Mountains. 1. A range which runs through Jamaica from E. to W., and divides the island in two, attaining in parts an elevation of 7,000 ft. On the N. side the ascent is gradual through an undulating and healthy country, but the S. aspect is wild, rugged, and precipitous.

2. A range in New South Wales, Australia (lat. 30° to 34° S., long. 150° to 151° E.). It has an elevation here and there of 3,400 ft., and consists to a large extent of sheer cliffs enclosing vast valleys, both the upper and the lower lands being thickly wooded. Several rivers have their sources here, and either join the Macquarie or fall into the sea at Broken Bay.

Blue Nile. [NILE.]

Blue Pill, mercurial pill (*pilula hydrargyri*), has the following composition: Mercury, 2 parts; confection of roses, 3 parts; powdered liquorice root, 1 part. It is employed as a purge in 5 gr. or 10 gr. doses; and is also used to produce mercurialism, being then administered in small and repeated doses, and usually in combination with a small quantity of opium to prevent purgation.

Blue-ribbon OF THE TURF, the "Derby" stakes (q.v.). The term blue ribbon is applied to any great prize. The *Blue Ribbon Army* was the name adopted by the association of total abstainers afterwards called the Gospel Temperance Union.

Blue Ridge, or SOUTH MOUNTAINS, is the name given to the E. branch of the Alleghanies, U.S.A. Starting in N. Carolina it stretches across Virginia as far as the Susquehanna river in Pennsylvania. It is about 130 miles from the sea, and its highest point is 4,000 feet.

Blues, a group of butterflies including eight British species. *Polyommatus corydon*, the "Chalk Hill Blue," is a well-known species, but *P. icarus* is the commonest. The females of most species are brown, and in some individuals two of the wings are blue and two brown; in such cases they are said to be hermaphrodite.

Blue-stocking, a literary lady; the term is generally used in derision. The name derives its origin from certain assemblies at the houses of different ladies, held about 1750 in London, where a certain Mr. Stillingfleet attended who was in the habit of always wearing blue stockings. The term thus got to be applied to those who frequented the meetings.

Blue-throat (*Ruticilla suecica*), a beautiful singing bird, closely allied to the Redstart (q.v.), visiting Europe, and occasionally Britain, in the summer. These birds feed on earthworms, insects, and berries, and the song is sweet and varied. Length of adult male about 6 in.; upper surface and two central tail feathers rich brown, other tail feathers bright chestnut at lower half, rest black; belly greyish-white; chin, throat, and upper part of breast brilliant blue, bordered below with black, and then a line of white. Three forms exist: (1) with a large spot of bright bay in the centre of the blue; (2) having the bay spot replaced by white; and (3) with the throat entirely blue.

Blue-winged Teal (*Querquedula discors*), an American species distinguished by the blue wing-coverts and green speculum bordered above with white, and ranging from Saskatchewan and the 58th parallel to Guiana and the West Indies, breeding principally in the north and west of the continent. When the first frost comes on these birds travel south, and are then found abundantly in the inundated rice-fields of the Southern States. They frequent muddy and reedy shores, flying out from cover with great rapidity, and when they alight they drop suddenly like snipe or woodcock. The note is a low rapid quack. The adult male is about 18 in. long; general plumage on upper surface brownish and blackish green; wings, shades of blue; head, black on crown; sides and neck, purple-green; a crescent-shaped white patch in front of each eye; under surface, orange-red marked with black. In the female the head and neck are dusky. These birds are highly esteemed for the table, and they might readily be domesticated. [TEAL.] In India the name is applied to the garganey (q.v.), which occurs in that country as a winter visitor.

Blum, ROBERT, born at Cologne in 1807, of poor parents, was apprenticed to a trade, but became a clerk, and in 1831 was appointed secretary of the Leipzig theatre. He then engaged himself actively both in literature and politics, writing several books and starting the Schiller-Verein, the Literatur-Verein, and other societies. His influence with the people prevented an outbreak at Leipzig in 1845, and after the revolution of 1848 he was sent as a democrat to the National Convention. He joined the besieged insurgents in Vienna later in the year, was made prisoner, and shot. He has since been regarded as a martyr in the popular cause.

Blumenbach, JOHANN FRIEDRICH, was born at Gotha in 1752, and evinced in childhood a taste for anatomy, having begun at the age of ten to form his great museum. He studied at Jena, and becoming professor at Göttingen in 1776, he held the post for nearly sixty years. Among his many works may be mentioned the *Institutiones Physiologicæ*, a *Manual of Natural History*, a *Manual of Comparative Anatomy and Physiology* (translated into all the chief languages of Europe), and the *Collectio Craniorum Diversarum Gentium*, which gave great impulse to the study of craniology. He twice visited England. In 1835 he was forced by age to give up lecturing, but he survived until 1840.

Blumenthal, JACQUES, was born at Hamburg in 1829, and studied music under Herz in Paris, becoming a very skilful pianist. At the age of 20 he came to London, and was appointed pianist to Queen Victoria. He was very successful as a performer, a teacher, and a composer of songs and fugitive pieces, of which *My Queen* and *The Message* are fair samples. He died in 1908.

Blumenthal, LEONARD VON, Field Marshal, was born at Schweldt on the Oder in 1810, and entered the Prussian army in 1827. After serving for 22 years with various regiments he was put on the general staff, of which he became afterwards the chief. He distinguished himself in the Schleswig-Holstein campaign of 1849, and in the course of the next few years was frequently sent on missions to England, with which country he was connected by marriage. In the Danish war of 1863–64 he was chief of the general staff, and earned high honour for his courage and ability. In 1866 he accompanied the Crown Prince throughout the Austrian campaign, as chief of the staff, and in the war with France was again attached in the same capacity to the heir-apparent when he commanded the third army. In 1878 he attended the autumn manœuvres in England, and in 1888 received the field-marshal's baton. He died in 1900.

Blunderbuss, a short gun, formerly in use, with a wide bore, capable of firing many balls or slugs at once. It was only of use for short range.

Blunt, JOHN HENRY, D.D., born at Chelsea in 1823, was brought up as a wholesale chemist, but in 1850 went to Durham University and was ordained. In 1873 he was appointed to the Crown living of Beverstone, and died in 1884. He was a voluminous and popular writer on ecclesiastical subjects. His best known work is a *History of the English Reformation* (1868), but his *Dictionary of Doctrinal and Historical Theology*, *Dictionary of Sects and Heresies*, and *Annotated Book of Common Prayer* are exceedingly useful publications.

Blunt, JOHN JAMES, born in 1794, was educated at St. John's College, Cambridge, where he took a fellowship. After holding a rectory in Essex till 1839, he was appointed Lady Margaret Professor of Divinity at Cambridge, and died there in 1855, having refused the bishopric of Salisbury in the previous year. He was the author of several theological works, among which *Undesigned Coincidences* may be regarded as important.

Bluntschli, JOHANN KASPAR, born at Zurich in 1808, became professor of law in the university there. He took an active part in Swiss politics first as a Liberal, but after 1839 as a Conservative, though he presently adopted a middle course and endeavoured to form a Liberal-Conservative party. In 1848 he went to Munich as professor of civil and international law, and in 1861 transferred his home to Heidelberg. He wrote a history of Zurich, and another of the Swiss Confederation, and various treatises on legal subjects, the chief being his

Allgemeines Staatsrecht. He was an ardent supporter of religious liberty, and as president of the Protestantenverein had just delivered an address at the general synod, when he died suddenly in 1881.

Blushing, the reddening of the face which accompanies certain mental states is due to relaxation of muscular fibres of small arterioles, allowing of an increased flow of blood to the affected part. It is a curious example of the involuntary influence of the mind upon vasomotor nerves. Blushing is confined to the human subject, and is more common in women than in men. The face, ears, and neck are alone affected, as a rule, but in rare instances blushing has been noted as extending to other parts of the body, and it is said that in some savage races blushing involves a much larger area of the skin than among civilised communities. Many facts concerning blushing and a theory with respect to its causation will be found set forth in Darwin's work on the *Expression of the Emotions.*

Boa, a name loosely applied to any large snake that kills its prey by crushing. Properly the term is confined to serpents of the family Boïdæ (from tropical America and the Eastern Archipelago),

Boa (*Boa constrictor*).

distinguished from the pythons of the Old World by the absence of teeth on the premaxillæ, and by the single row of inferior shields on the tail. The boas have an enormous gape, and the small teeth all point inwards. The tail is prehensile, and the rudiments of hind limbs which end in horny anal spurs assist these animals to suspend themselves from branches of trees whence they swoop down on their prey, which consists of small mammals; rats, according to Wallace, being their favourite diet. In captivity they are fed on ducks, pigeons, and guinea-pigs, and after a meal they require a long period of digestion. The young are extruded alive, the eggs being hatched within the parent. The largest species is the Anaconda (q.v.). The common boa (*Boa constrictor*) is said to attain a length of 20 feet, and specimens of from 12 to 14 feet are often met with. The colour is a reddish-grey with wavy longitudinal stripes. Wallace (*Travels on the Amazon*) says that boas "are not at all uncommon, even close to the city (Pará), and are considered quite harmless. They are caught by pushing a large stick under them, when they twist round it, and the head being cautiously seized and tied to the stick, they are easily carried home."

Boabdil (Arab. *Abu-Abdallah* or *Ez-Zogoiby,* the Unlucky) was the last occupant of the Moorish throne of Granada, from which he drove his father Abdul-Hassan in 1481. He was captured in 1483 by the King of Castile, and made a nominal tributary, returning to Granada to resume his struggles against his father and uncle. In 1491 the Moorish capital fell to Ferdinand, though Boabdil fought with a courage strangely at variance with his infirmity of purpose. As he rode away to the coast he halted on a ridge at Padul, still called *El Ultimo Soapiro del Moro* (The Moor's last sigh), to take a farewell look at the Alhambra, and burst into tears at the sight. Whereupon his mother is said to have thus reproached him: "You may well weep like a woman for what you could not defend like a man." He died shortly afterwards on the field of battle in Africa.

Boadicea, the wife of Prasutagus, king of the ancient British tribe, the Iceni, whose territories lay on the E. coast. Her husband, on his deathbed (60 A.D.), left his property to her and his two daughters jointly with the Emperor Nero. The Romans, however, seized all, and when Boadicea complained, scourged her publicly, whilst the daughters were outraged. This infamy roused the Britons, and they found a courageous leader in the queen. Roman soldiers and colonists were being massacred freely, and there was every prospect of the whole province being lost to the empire, when Suetonius Paulinus landed with an army from Mona (62 A.D.), and in the district between Colchester (Camalodunum) and London defeated the queen, who soon afterwards poisoned herself. The story preserved by Tacitus and Dio Cassius furnished Cowper with a theme for a spirited poem.

Boar, the male of the Swine (q.v.). The Wild Boar (*Sus scrofa*), from which most of the domesticated varieties are probably derived, is a large, fierce animal, usually measuring between 3 ft. and 4 ft., exclusive of the short tail, though greater measurements rest on good authority. The general hue is dusky brown, or greyish with a tendency to black, sometimes diversified by black spots or patches. The head is elongated, the neck short and thick, and the body massive and muscular. In the males the canine teeth, or tusks, form terrible weapons of offence and defence, projecting

considerably beyond the jaws. In the domesticated variety these teeth are much reduced in size. The hairs of the body are coarse, and mixed with a kind of wool; those on the neck and shoulders are long enough to form a kind of mane, which the animal erects when enraged. The female is smaller than the male, and has much less prominent tusks; she bears from four to six at a litter, and the young are yellowish, with longitudinal reddish-brown stripes. These animals are, in general, vegetable-feeders, though they devour snakes and lizards—the semi-feral pig of the Western States of America is the deadly foe of the rattlesnake—and when pressed by hunger they will even feed on carrion. They are nocturnal in habit, and their practice of ploughing long furrows in the ground in search of roots inflicts much damage on farmers, gardeners, and vine-dressers. There are three types or races of Wild Boar, which some naturalists have dignified

WILD BOAR (*Sus scrofa*).

with the rank of species—the European, the African, and the Indian. The first is found in Central and Southern Europe; the second in the forests north of the Sahara; and the third in Central and Southern Asia, as far east as New Guinea. The chase of the Indian Wild Boar is in high favour with Europeans: the hunters are mounted and armed with spears, and the sport is popularly known as "pig-sticking." The Wild Boar was formerly common in Britain, but became extinct towards the end of the 17th century. Attempts have been made by sportsmen to introduce these animals once more, as beasts of chase, but in at least one case "the country rose upon them and destroyed them;" and in another, the sportsman who made the experiment was so enraged by a favourite horse being wounded by a wild boar, that he caused the whole herd to be destroyed. [HOG, PIG, SWINE.]

Boarding-out System, a system by which workhouse children are placed in the houses of poor people, to whom a certain sum is paid for the maintenance of the children, and who adopt the children practically as their own. The supporters of the system maintain that it effectually does away with all the associations of the workhouse, and tends to make the children ordinary members of society. The opponents urge, however, the temptation afforded to the persons with whom the children are lodged, to ill-treat the children, for whom they can have no feelings of parental affection. This danger is, however, partly provided against by a systematic inspection. The *boarding-out* system is gaining ground in England, and is frequent in Scotland.

Boardman, GEORGE DANA, was born in the state of Maine, U.S.A., in 1807, and educated for the Baptist ministry. He went out to Burmah as a missionary in 1825, and, having mastered the language, worked with great success for some years in the Moulmein district. Overwork in a trying climate undermined his health, and he died in 1831.

Boar Fish, a popular name for any fish of the genus *Capros*, of the Horse-mackerel family. The body is compressed and elevated, like that of the Dory, but there are no spines at the base of the dorsal or anal fin. The single species (*C. aper*), about 6 inches long, carmine above, lighter below, is common in the Mediteranean, and has been taken on the south coast of England.

Boat. The length and approximate weight of the principal classes of boats which are used in the British navy, and to a great extent also in the mercantile marine, are as follows:—

PULLING OR SAILING BOATS:—	Length, feet.	Weight, cwts. qrs.
Dingey	12	3 1
Dingey	14	4 2
Whale Gig (life)	27	7 3
Whale Gig	25	7 0
Whale Gig	27	7 2
Cutter Gig	20	7 0
Gig	22	7 1
Gig	24	7 1
Gig	26	7 3
Gig	28	8 0
Gig	30	8 3
Gig	32	9 0
Jolly boat	16	6 0
Jolly boat	18	8 0
Cutter (life), cork lined	28	20 0
Cutter (life), cork lined	32	20 3
Cutter	25	15 0
Cutter	26	16 0
Cutter	28	16 3
Cutter	30	18 2
Cutter	32	19 3
Pinnace	30	41 0
Pinnace	32	43 2
Launch, unsheathed	40	67 2
Launch, unsheathed	42	75 0
STEAM BOATS (WITH MACHINERY):—		
Cutter	28	45 0
Pinnace	30	60 0
Pinnace	37	105 0
Launch	42	148 to 155 cwt.

Boats are found to gain in weight each year of usage. Barges are cutters or gigs never rowing less than ten oars. A longboat is the largest of a ship's sailing boats. Boats are either clinker or carvel built. In clinker-work each plank overlies the plank next below it; in carvel-work the edges of the planks meet flush together, and are caulked. Of boats which are not ship's boats there is an almost endless variety. The wherry is a light sharp boat, chiefly used for passenger and small luggage traffic in rivers and harbours. Punts are oblong flat-bottomed

boats. Out-rigged racing boats were introduced about the year 1840, and were first used in the annual Oxford and Cambridge races in the year 1846. Those of that date, however, were comparatively heavy and cumbrous, and it was not until 1857 that the present style of boats without keels was used. The further improvement of sliding seats was introduced in 1873. For life-boat, *see* the article LIFE-BOAT.

Boat Bill (*Cancroma cochlearia*), a short-legged bird of the Heron family, deriving its popular name from its bill, which has been compared to two boats laid gunwale to gunwale, the ridge and hooked point of the upper mandible lending force to the comparison. This bird, about the size of a common fowl, is confined to South America: it haunts marshes, swamps, and the banks of rivers, feeding on fish and crustacea, and capturing its prey like the Kingfisher. General plumage grey, washed with misty red, under-surface whitish, belly rusty red. The male has an erectible black crest.

Boat-lowering Apparatus, apparatus for lowering a boat, by which it is always kept in a horizontal position, and when it reaches the water it is detached simultaneously at both ends from the supports.

Boat-racing. [ROWING.]

Boatswain, an officer who has special charge of a ship's boats, sails, colours, anchors, rigging, cables, and cordage. It is likewise his business to summon the crew to their duty, and for this purpose he uses a whistle of peculiar form. In the royal navy the boatswain is a warrant officer, ranking immediately above a midshipman, and his pay may vary from £100 7s. 6d. to £150 11s. 3d. a year, and he may obtain, on retirement at the age of 55, or earlier by necessity or special permission, a maximum pension of £150. If, however, he be in the meantime promoted to be chief boatswain, his maximum pension becomes £219, and he may obtain on retirement the honorary rank of lieutenant.

Bobadil, the name of a swaggering but cowardly captain in Ben Jonson's comedy of *Every Man in his Humour*. So cleverly is the character drawn that the word has passed into a generic term for military braggarts. It may have been derived originally from Boabdil (q.v.), the story of whose weakness was familiar to writers of the period.

Bobbin, in *Spinning*, a spool with a head at one or both ends to hold yarn. The term is also applied to the weights used to steady the threads in pillow-lace making.

Bobolink, Bob-o-link, Boblink (*Dolichonyx oryzivorus*), the popular name of the single species of Dolichonyx, a genus of Hang-nests (q.v.). It is a migratory bird, found in the summer all over the American continent, from Canada to Paraguay, passing the winter in the West Indies, where, in some parts, it is known as the Butter-bird, from its plumpness, and, as in America, is highly valued for the table. These birds arrive in the Southern States about the middle of March, and then do good service to the farmers by destroying worms, insects, and larvæ. They continue their flight northwards, and rarely breed south of 40° N. On their return journey south they commit great depredations in the rice-fields, especially before the grain has fully ripened. At this time they are in excellent condition, and are shot in great numbers for the market. From their frequenting the rice-fields they are known as Rice-birds, Rice-buntings, or Rice-troopials. The male is rather more than 7 inches long, and in his summer plumage has the head, fore part of the back, shoulders, wings, tail, and under-surface black, scapulars, rump, and upper tail feathers white, patch of yellow on the nape. From its black and white plumage it is sometimes called the Skunk-bird, apparently for no better reason than that its coloration resembles that of the unsavoury quadruped. After the breeding season the male assumes the plumage of the female—brownish-black above, dirty yellow beneath—and the young males are like the females. The ordinary popular name is derived from the note of the bird, which has considerable vocal power, and is often kept as a cage-bird in the United States.

Bobruisk, fortified town in the government of Minsk, Russia. It is situated at the confluence of the rivers Bobruiska and Beresina. Until the beginning of the 19th century, when the fortress was built, it was a place of small importance. There is some trade with the south by the river which is navigable, and pottery is made there. Until recently the Jewish element formed half of the population.

Boca Tigre, BOCCA TIGRIS, or "THE BOGUE" (Chin. *Hu-mun*, tiger's mouth), a name of Portuguese origin given to the mouth of the Canton river known to the Chinese as Choo-Kiang or Pearl river. "The Outer Waters" or broad estuary extending southwards is blocked to some extent about 45 miles below Canton by five islands, all of which were strongly fortified to check any advance by water to Canton. The "Bogue" forts were captured by the British in 1841 and in 1856, and were completely dismantled.

BOCA, signifying *mouth*, has been applied by the Spaniards and Portuguese to many straits and rivers, *e.g.* Boca Chica in New Granada, Boca de Novios at the outfall of the Orinoco, Boca Grande and Boca del Toro in Costa Rica.

Boccaccio, GIOVANNI, the illegitimate son of a Florentine merchant and an unknown French lady, was born, probably at Certaldo, near Florence, in 1313. Little is certain as to his early life, but he appears to have been carefully brought up by his father, who destined him for commerce, but finding that career distasteful allowed him to study law. Giovanni, however, from the age of seven conceived a passion for the Muses, and in 1333, having given up legal pursuits for some mercantile position at Naples, he came in contact with Petrarch, afterwards his life-long friend, and he also (1341) fell in love with Maria, a natural daughter of the king. Both of these circumstances

stimulated the young man to cultivate poetry and literature. Fiammetta, as he styled his lady-love, at once encouraged him, and supplied, like Beatrice and Laura, a source of inspiration, though of a less ideal kind. At her bidding he composed his first prose romance, *Filocopo*, relating the familiar adventures of Florio and Biancafiore in rather heavy style. Then followed the *Teseide*, a heroic poem dealing with the story of Palamone and Arcito, and remarkable as being the earliest example of the *ottava rima*, and as having provided material for Chaucer and Dryden. About 1341 Boccaccio was recalled to Florence by his father, and whilst parted from his mistress, wrote *Anuto*, half in prose, half in verse, introducing her among the characters, and *L'Amorosa Visione*, an acrostic of portentous dimensions, writing a poem to her under her real name. *L'Amorosa Fiammetta*, which next appeared, describes the emotions of the lady on parting with her swain. In 1344 he managed to get back to Naples, where the beautiful, brilliant, but dissolute Joanna I. was now reigning. The queen gave every encouragement to the young poet, and at the court he wrote most of the stories comprised in the *Decamerone*, as well as *Filostrato*, known to English readers through Chaucer's unacknowledged adaptation. Returning to Florence in 1350 on his father's death, he was well received and employed in various foreign missions. It was by his urgent advice that Petrarch was invited to take a leading position in the newly-founded university. He devoted himself eagerly to the study of the classics, learned Greek, and with his own hands laboriously copied many manuscripts rescued from the monks. In 1353 appeared the first edition of the *Decamerone*, putting before Italians a model of prose style that time has not yet impaired in any degree. Dante's *Vita Nuova* and the *Cento Novelle Antiche* had revealed already some of the power of the language, but Boccaccio was the first to impart to his native tongue that ease, flexibility, and subtle charm which made it so delightful a vehicle for description, narrative, or playful wit. The *Decamerone*, not in itself original as regards matter, has been to succeeding writers a quarry from which they have freely hewn the stones of which their own poetical structures have been built, Chaucer, Shakespeare, Dryden, Keats, and Tennyson, among others, being indebted to this source. To a critic of Teutonic race and modern culture nothing seems more astounding and unintelligible than the way in which Boccaccio blends the deepest pathos with the cynicism of a voluptuary, and the appreciation of moral virtue with the grossest indecency. But it must be remembered that he lived in a licentious age when hypocrisy was less esteemed than at present, and, like Chaucer and Shakespeare, he will be found to have raised rather than lowered the ethical standard of his contemporaries. Until 1360 Boccaccio lived at Florence, and occasionally served the state in negotiations abroad. He then retired to Certaldo, and a religious change came over him, inducing him to take nominal orders in 1362. Next year he visited Naples again to write the exploits of the Seneschal Acciajuoli, but he was not well received, and does not seem to have performed his task. Until 1373 he was either at Florence or Certaldo, spending also much of his time in visits to Petrarch or other friends, and composing several Latin treatises on historical, mythological, and geographical subjects as well as *Il Ninfale Fiesolano*, a love-story in verse, and a number of *Rime*. He was not wealthy, but he appears to have been a liberal buyer of books, and to have been quite independent of patrons. The University of Florence having founded a chair for the study of Dante, he delivered an able series of lectures on the *Divina Commedia*. The loss of Petrarch in 1374 was a severe shock to his friend, whose health was already failing, and he died at the close of 1375 with the consolations of the church. He was never married, but had several natural children, none of whom survived their father.

Boccage, Marie Anne Figuet du, was born at Rouen in 1710, her maiden name being Le Page, and married in her childhood a French employé at Dieppe, who soon left her a widow. Migrating to Paris, she was welcomed there both for her literary tastes and her agreeable person. Her chief works were *La Colombiade*, a quasi-epic, in ten cantos, *Les Amazones*, a tragedy, *Le Paradis Perdu*, a feeble imitation of Milton, and *La Mort d'Abel*, a no less dull reflection of Gesner. Her *Letters* are interesting, as she lived in a society of which Fontenelle and Voltaire were the leaders. She died in 1802.

Boccherini, Luigi, born at Lucca in 1740, and carefully trained as a musician by his father, who followed that profession, associated himself as a composer with Manfredi, the violinist. They went to Paris together (1770) and there Boccherini's *Divertissements* were first printed with great success. The two friends next visited Spain, and were cordially welcomed, but though he held appointments at the Court, Boccherini appears to have lived in poverty and obscurity, dying in 1805. His works were very numerous, and show much fluency and ease combined with a sound knowledge of instruments, especially of the violoncello. He has been styled "the wife of Haydn."

Bochart, Samuel, was born at Rouen in 1599, and showed early great aptitude for Greek and Latin scholarships. His studies were pursued at Paris, Sedan, Leyden, and Oxford. When he became Protestant pastor at Caen at the age of four-and-twenty he had acquired a considerable knowledge of Hebrew and other Oriental languages. It was not, however, until 1646-7 that he published *Phaleg* and *Canaan*, forming together a treatise on sacred geography that won him the fame of being among the most learned men of Europe. In 1652 Christina, Queen of Sweden, invited him to Stockholm, but no good came of the visit. Returning to Caen he brought out his *Hierozoicon*, which was printed in London, and in 1667 fell dead whilst arguing some archæological point before the Academy of Caen.

Bocholt, a town in the circle of Borken and government of Münster, Prussian Westphalia. It

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antiquarian, and philosophical. He laboured assiduously in this wide field, and the first result was his fine edition of Pindar with a dissertation on metres which threw a new light on the subject. Next came *Die Staatshaushaltung der Athener*, a minute and critical account of the political economy of Greece, followed by treatises on the naval affairs, money, weights, and measures of Athens. Lastly, he edited for the Berlin Academy of Sciences the *Corpus Inscriptionum Græcarum*. In his minor writings there is scarcely a topic connected with Greek life on which he did not touch. He was an authority on chronology, on Platonic doctrine, on ancient astronomy, and on the science of education. He edited and translated the *Antigone*, and collected the doubtful fragments of Philolaus. He died in 1867.

Boehm, Sir Joseph Edgar, was born in Vienna of Hungarian parentage in 1834, his father being director of the Austrian Mint. He was in England to pursue his studies as a sculptor from 1848 to 1851, but it was not until 1862, after he had distinguished himself at home, that he permanently settled in London. His natural abilities, aided by Royal patronage, soon brought him to the front. He had in 1867 executed a colossal statue of the Queen, and several of his works, including the memorials of Princess Alice, the Prince Imperial, and the Emperor Frederick, are to be seen at Windsor. Among other specimens of his skill the most noteworthy are the statues of Sir John Burgoyne, Lord Lawrence, and Lord Napier of Magdala, in Waterloo Place, and of William Tyndal and Thomas Carlyle on the Thames Embankment, of Lord John Russell in Westminster Hall, of the Duke of Wellington at Hyde Park Corner, and of John Bunyan. Boehm cannot, perhaps, be ranked among the greatest sculptors, for he seldom attempted more than the elevation of modern portraiture to a decent artistic level, but he succeeded admirably in what he undertook. He was appointed Sculptor in Ordinary to the Queen in 1881, and Royal Academician in 1882. He died very suddenly on December 12th, 1890, and at Her Majesty's desire was buried with full honours in St. Paul's Cathedral.

Boehme, or Behmen, Jakob, was born at Alt-Seidenberg, a village near Görlitz, Prussia, in 1575, where he was apprenticed to a shoemaker, pursuing the business till he had made a competency. From infancy he appears to have been subject to peculiar mental phases, which he regarded as spiritual revelation, and in 1612 he ventured to write, but not to print, a treatise *Morgenröthe in Auffgang*, better known as *Aurora*, in which he endeavours to set forth his insight into the divine nature. The chief pastor denounced his doctrines, and he was silenced for some years. In 1618 he again resumed his attempts to put his views into words, but published nothing until 1624, when his *Way to Christ* appeared, consisting of sundry devotional tracts. These he had to defend before the Consistorial Court at Dresden, and on his return thence he died in November, 1624. His posthumous works contain something approaching a systematic exposition of his mystical theosophy, setting forth (1) the nature of God in himself; (2) the manifestation of the Deity in the physical world; (3) the life of God in the soul of man. Many of his speculations are derived from earlier thinkers and put together in a strange philosophical jargon invented by himself, but when he gives way to the expression of his own simple feelings his utterances rouse sympathy and veneration. He has exercised a powerful influence on Protestant mystics, and the sect of Behmenists, merging into the Quakers, survived for over a century in England and Holland. Hegel acknowledges him as one of the fathers of German philosophy, though his mind was not by any means of a philosophical turn.

Boehmeria, a genus of the nettle tribe, growing in tropical and subtropical climates, and differing mainly from the nettles in not having stinging hairs. Several of the species yield valuable fibres. *B. nivea*, the tchou-ma of China, the rhea of Assam, yields the China grass-cloth, a fabric rivalling the best French cambric. It is a perennial shrub, four to six feet high, with heart-shaped leaves covered with silvery-white down on their under surfaces. The inner bark of young stems yields the best fibre, the outer part being coarser but useful for cordage. Rhea fibre has nearly double the tenacity of Russian hemp. It is largely cultivated in India and the Southern United States, and, though susceptible to frost, might be grown in Europe. *B. Puya*, of Nepaul and Sikkim, with broadly lanceolate leaves, yields Puya fibre, and *B. albida* is used for textile purposes in the Sandwich Islands.

Bœotia, a country of ancient Greece, having the Gulf of Corinth, Megaris, and Attica to the S., Attica and the Euripus to the E., the Locri Opuntii to the N., and Phocis to the W., with an area of about 1,119 sq. m. Pent in to the landward by mountains, Bœotia is roughly divided into the valley of Lake Copais, and the valley of the river Asopus, with the Theban plain between them, and the coast district stretching from Mount Helicon to the Corinthian Gulf. The former valley had no outlet for the waters of the Cephisus except natural underground passages (Katavothra), until some primitive race, probably Minyans, made huge drains into the Eubœan Sea. Then the district became noted for its fertility, as were also the Theban plain and the basin of the Asopus, but neglect has now reduced much of the lowlands to marshy water. The heavy moist air was supposed by the ancients to blunt the intellects of the inhabitants, and the name Bœotian was synonymous with blockhead. Still Pindar, Hesiod, and Plutarch were Bœotians. In prehistoric times the country is said to have been possessed by various tribes, but soon after the Trojan war an Æolian immigration swept these away, and established a sort of federal union with Thebes as its centre and a common temple at Coronea, the administration being conducted by elected Bœotarchs. This confederacy existed nominally until the Roman

emperors. Thobes, Platæa, Thespiæ, Orchomenus, and many other cities flourished in early times, but all had dwindled into insignificance when Rome became supreme. Under the Turks Livadia was erected into the capital. Bœotia forms one Nomos with Attica, and is largely peopled by Albanians.

Boerhaave, HERMANN, was born at Vorhout near Leyden, in 1668. He distinguished himself at the university of Leyden under Gronovius and other eminent teachers. At his father's death he took up medicine, and in 1701 was appointed lecturer on that subject, and on botany at Leyden. In 1714 he became rector of the university, and professor of practical medicine, and four years later he occupied the chair of chemistry. As a clinical teacher and an investigator of disease his fame was deservedly great, and to his professional talents he added piety, grave, yet cheerful manners, and a considerable knowledge of languages. His chief works were *Institutiones Medicæ*, *Aphorismi de Cognoscendis et Curandis Morbis*, *Libellus de Materia Medica et Remediorum Formulis*, and *Institutiones Chemicae*. He died in 1738, after a long illness.

Boers (pron. Bûrs), the Dutch, as opposed to the English-speaking settlers in South Africa, who are mostly peasant farmers; hence the name, which is the same as the German *Bauer*, and the English *boor* in its undegraded original meaning of a free peasant, from a Teutonic root *bu*, as in Anglo-Saxon *buan*—to till, cultivate. The first permanent Dutch settlement (at the Cape of Good Hope) dates from the year 1652, after which they were joined by many German and French (Huguenot) immigrants, who all ultimately adopted the Dutch language, and thus became merged in the general Boer population. The Boers were mainly centred in the western districts of Cape Colony proper, and in the Orange River Colony, and in the Transvaal. In 1899 matters had become very much strained between the Transvaal Government and the British Government—mainly owing to the treatment of the Outlanders (q.v.) and the feelings generated by the Jameson Raid (q.v.)—and things culminated in a war (1899-1902), in which the Boers were defeated and the territory of the Republics annexed by Great Britain, though the war continued for a long time after. Peace was declared in May, 1902, all the Boer leaders taking the oath of allegiance; and in May, 1910, by the Act of Union their territories became one with the other British Colonies in South Africa.

Boëtius, ANICIUS MANLIUS SEVERINUS, was probably born about 457 A.D. at Rome, where his father was consul in 487 under the rule of Odoacer. Little is known of his early life, but he appears to have lived in the highest society, and was a favourite with Theodoric, Odoacer's successor. He married a senator's daughter, and had two sons. He was consul in 510, and his sons held the office jointly in 522. His opposition to official injustice led his enemies to bring against him a false charge of treason. He was imprisoned by Theodoric, and after some delay was put to death in 522. During his imprisonment he wrote his famous book *De Consolatione Philosophiæ*, in five parts, using prose and verse alternately. In a dialogue with personified Philosophy the problems of the moral government of the universe are discussed reverently and intelligently, but not a symptom of Christian belief can be detected throughout the book, which is largely indebted to Seneca for language and matter. Gibbon praised it highly, and, oddly enough, the Church of Rome conceiving that Boetius must have been orthodox as Theodoric was an Arian, treated the author as a martyr, and canonised him as Saint Severinus. Boetius, through his admiration for Greek literature, which led him to translate and comment on some treatises of Aristotle, exercised a favourable influence during the Middle Ages, and kept alive some slight knowledge of ancient philosophy. The Christian treatises ascribed to him are of doubtful authenticity.

Bog, an area of porous soil insufficiently drained so that it becomes more or less saturated with water. Bogs may occur at any altitude, often occupying ledges on mountain sides or depressions in upland moors where there is a high rainfall. They may consist mainly of wet sand almost destitute of vegetation (quicksands), or their depth and extent may be largely added to by the growth and decay of certain aquatic plants. A forest stream, for instance, obstructed by a tree blown down by the wind, may expand into a pool, and from the sides of this, or any other body of stagnant water, the growth of bog-moss (q.v.) or similar plants may extend until they occupy the whole area, and then by displacing the water, expand the pool, undermine surrounding trees, and convert a wide tract of forest into a treeless swamp. The peat-bogs of Ireland commonly occupy the sites of lakes, and have layers of fresh-water shell-marl below the peat-moss. The decaying vegetation in a bog produces black carbonaceous matter or peat, colours the water, and charges it with acids known as humic acids, the chemistry of which is little known. Having a great affinity for oxygen, these acids have a reducing effect upon salts of iron, converting the sulphate into sulphide, rendering the peaty water chalybeate, and so causing it on evaporation to deposit bog iron-ore (q.v.). Though it is a laborious process, bogs may be reclaimed and converted into valuable agricultural land. Draining, turning down the heathy sod to decay, and dressing with a hot mixture of four tons of lime and five cwt. of salt and then with guano, produced good crops of potatoes and oats on Chat Moss, Lancashire.

Bogardus, JAMES, 1800–1874, an American inventor, was a watchmaker's apprentice. He began by improving the construction of eight-day clocks, and afterwards invented an engraving machine, a dry gas-meter, a transfer machine for producing bank note plates from separate dies, a plan—adopted by the British Government—for making postage stamps, a pyrometer, a deep-sea sounding apparatus, and a dynamometer. He also improved the manufacture of indiarubber goods.

Bogatzky, KARL HEINRICH VON (1690–1744). German theological author, born at Jankowe in Lower Silesia. He studied divinity at Halle from 1715 to 1718, and was for some time in the service of different Silesian nobles. He afterwards organised an orphanage at the Silesian village of Glaucha. In 1746, at the death of the Duke of Sachsen Saalfeld, in whose family he had lived, he retired to Halle and gave his time to writing devotional books. His best known work is *The Golden Treasury*. He also wrote hymns and an autobiography.

Bogdanovitch, HIPPOLYTE (1743–1803), a Russian poet, called by his fellow-countrymen "the Russian Anacreon." He studied at the university of Moscow, and was intended for the army. The frequenting dramatic performances gave him an irresistible turn for literature. His best known work is a poem, *Psyche*, which, in an agreeable and simple style, describes in a succession of allegories the dissolute manners of the Russian aristocracy.

Bogermann, JOHANN (1576–1633), President of the Synod of Dort. He studied at Heidelberg and Geneva, and then became pastor of Leeuwarden, and took an active part in religious controversy, especially in that against Arminius. He was elected President of the Synod of Dort in 1718. He was professor of divinity at Franeker. His principal work was the translation of the Bible into Dutch, the edition which he superintended soon becoming the standard one.

Boghead Coal, TORBANITE, or TORBANE HILL MINERAL, is, or rather was, a valuable source of paraffin. It is amorphous, yellow or light-brown, soft and light, its hardness being 1·5 to 2, and its gravity 1·28. Its composition is 60 to 65 per cent. carbon, 9 hydrogen, 4 or 5 oxygen, the remainder being aluminium silicate, and the microscope shows it to consist of granules of a yellow wax in shaley matter. It yields a larger amount of luminous hydrocarbons than any cannel coal, giving upwards of 120 gallons of crude oil from a ton. It occurred at Boghead, Torbane Hill, and elsewhere in Linlithgow, where since 1860 it has been nearly exhausted; in the Lower Greensand in the Isle of Wight; at Pilsen in Bohemia, and in Russia. In 1853 it gave rise to a lengthened lawsuit, involving the definition of the term coal.

Bog-iron Ore is an earthy form of limonite ($2Fe_2O_3 + 3H_2O$) or other hydrous iron-oxide, with hydrous manganese-oxide iron-phosphate, and other substances frequently mixed with clay or sand, yellow, brown, or black in colour. It is precipitated by the oxidation of iron-salts in solution in the water of peat on its exposure to the air. It may be deposited *in situ*, as in the "moor-band pan," a layer of hard ironstone forming on an impervious subsoil under peaty ground, or it may be carried by streams into lakes, forming the lake-ore (sumpferz) of Scandinavia. Though decaying vegetable matter plays an important part in reducing these iron-salts in solution, there is apparently no foundation for Ehrenberg's opinion that the rapid precipitation of lake-ore is due to the action of diatoms.

Bog-moss (*Sphagnum*), a large genus of mosses of world-wide distribution, having a structure specially adapted to their aquatic mode of life. They only possess roots when young, the base of the stem decaying into peat while its upward growth is continued by a succession of side shoots or "innovations." The stem has externally several layers of large cells destitute of protoplasm, with large perforations, by which water rapidly rises through the plant. The leaves also, which are only one cell thick, have similar cells surrounded by meshes of smaller ones containing chlorophyll. On removal from the water the whole plant rapidly dries and bleaches. It is extensively employed in packing plants and in cultivating orchids and bog-plants.

Bog-myrtle (*Myrica*), a widely-distributed genus of small, mostly dicœcious, catkin-bearing shrubs, the type of the order *Myricaceæ*. They have simple, scattered leaves, and numerous resin glands, the secretion of which is fragrant. Our British species, *M. Gale*, is known as sweet gale, and is the badge of the clan Campbell. The drupaceous fruit is coated with wax, whence the American names of candleberry and waxberry applied to other species of the genus.

Bognor, a watering-place in Sussex, a little over 9 miles S.E. of Chichester. Its development is quite recent. It has an iron pier 1,000 ft. long, and a good esplanade. It is of some geological importance as the seat of the Bognor beds of London clay. Pop. (1901), 6,180.

Bog-oak, the wood of the common British oak, when, having fallen into peat, it has become stained a deep black by the action of a natural ink formed by the action of the tannin which it contains upon the iron-salts in the peat. It is obtained in considerable quantity below the peat both in Ireland and Scotland, and is used for ornaments. The wood of yew in like circumstances becomes a deep brown.

Bogodukhof, a town of Russia in Europe, on the right bank of the Merl, in the government of, and about 43 miles from, Kharkof. There are tanneries, and the district is noted for its fruit crops; and the town has a trade in grain, cattle, and fish. It was taken by Menschikoff in 1709; and its ramparts and ditches may still be traced.

Bogomili (from Slav. words meaning *Gods' mercy*), a religious sect which arose in the 12th century at Philippopolis in Bulgaria, under a monk named Basil. Their theology was dualistic. From the Ultimate Reality proceeded a good and an evil principle, the latter—conceived as the creator of the world—being finally overcome by Christ. They were extreme ascetics, and rejected the Church, with its priesthood and other sacraments. Their leader was burnt by the Emperor Alexius Comnenus, but the sect continued to exist in Bosnia, where its presence tended to facilitate the reception of Mohammedanism upon the Turkish conquest by the Turks.

Bogos (properly BILIN), a Hamitic nation north of Abyssinia, about the river Anseba, where their chief settlement is Keren, recently occupied by the Italians from Massâwa. Their language, spoken by about 20,000, is akin to the Agau of Abyssinia, but the differences are so great that the two peoples cannot converse together. A branch of the Bilins on the east side of the Upper Anseba call themselves Sanahib. The government is patriarchal, each village being ruled by elders, and all profess the Christian religion, recognising the Abuna of Abyssinia as the head of their church. See Munziger, *Sitten und Recht der Bogos* (1875), and Professor Reinisch, *St. Mark's Gospel in Bogos* (1884).

Bogota, river of South America, in the Grenadine Confederation. Rising in Lake Guatavista 15 miles N. of Santa Fé de Bogota, it flows past that city, and after a course of 125 miles falls into the Magdalena. Into the Lake Guatavista the natives are said to have thrown their treasures when they were invaded by the Spaniards. At the cataract of Tequendama the waters fall over a precipice 700 feet high, and have hollowed out the rock below to a depth of 130 feet. Near the fall is the natural bridge of Icononzo.

Bogota, SANTA FE DE, town in South America, near the river Bogota, and on a table-land 8,694 feet high, which separates the basins of the Magdalena and Orinoco, capital of the Republic of Colombia (formerly New Granada) and of the State of Candinamarca. It is the seat of government and of an archbishopric, and of the supreme court of justice. It possesses a university, colleges, library, museum, botanical gardens, observatory, school of painting, and mint. Among its industries are manufactures of soap, cloth, and linen, and the preparation of leather. Printing and working in the precious metals are also carried on. The climate is wholesome and agreeable although very damp. There are frequent earthquakes, and the houses are in consequence mostly one-storeyed. Founded in 1538, Bogota was for three centuries the seat of the Spanish viceroyalty, and having been taken (1816) by the Spaniards after the declaration of independence, it was retaken by Bolivar (1819), and became the capital of the republic of Colombia till 1831, when that republic was subdivided. At that time Bogota was made the capital of New Granada, and since 1858 has remained the seat of government. The great drawback to its prosperity is the difficulty of transport; but a railway has been projected, and the neighbouring mountains give much promise of mineral wealth in the shape of iron, coal, and salt; while gold, silver, copper, and emeralds are also said to exist.

Bog Plants belong to many very different groups. The bulk of peat though generally composed of *Sphagnum* [*see* BOG MOSS], may be made up of rushes and sedges, as in the Cambridgeshire Fens, or of golden saxifrage (*Chrysosplenium*) or other plants. On wet sand or the spongy sides of slaty or limestone mountains, where there is no organic matter in the soil, the sundews (*Drosera*) and butterworts (*Pinguicula*), which get their nitrogenous food from captured flies, will flourish, and it is noticeable that all insectivorous plants are either bog-plants or water-plants, whilst many of them possess but very small roots. We may perhaps trace a connection between the presence of an abundance of small flying insects over bogs and the occurrence of many small flowered but beautiful plants in such places, such as the bog-asphodel (*Narthecium*), bog-pimpernel (*Anagallis tenella*), ivy-leaved bell-flower (*Wahlenbergia hederacea*), marsh St. John's-wort (*Hypericum elodes*), grass of Parnassus (*Parnassia*), and the plants already mentioned. Most bog-plants can be grown in sphagnum, if kept constantly moist; but the use of two porous pans, one inside the other, avoids the danger of decay from absolute stagnation.

Bog Spavin, the name given to a form of disease occurring in the horse, affecting the joint known as the "hock."

Bogue, DAVID (1750–1825), was born in Coldingham parish, Berwickshire. After studying theology in Edinburgh he was licensed to preach in Scotland, and in 1771 he went to London. From London he went to Gosport, where he was minister of an Independent chapel, and tutor in an Independent theological college. This became a great school of missionaries, and the nucleus of the London Missionary Society, in whose foundation David Bogue had a great hand. He would have gone himself as a missionary to India had not the East India Company refused their consent to his scheme. He was concerned in founding the British and Foreign Bible Society and the Religious Tract Society. He collaborated with Dr. Bennett in writing a *History of the Dissenters;* and among his other writings is an *Essay on the Divine Authority of the New Testament.*

Bohemia, a province of the Austro-Hungarian monarchy [AUSTRIA], situated between lat. 48° 33′ and 51° 4′ N., and between long. 12° 5′ and 16° 25′ E. Its area is 20,060 square miles.

Mountains. These lie chiefly around the borders of Bohemia, the principal ranges forming, in fact, the boundaries of the State. Thus the Erzgebirge separates it from Saxony in the N.W., the Riesengebirge from Prussia (Silesia) in the N.E., the Moravian Hills from Moravia in the S.E., and the Böhmerwald from Bavaria in the S.W. These have already been described under Austria.

Rivers. The Elbe rises in the Riesengebirge, and flows in a somewhat circuitous course through Northern Bohemia, passing through the mountains at Tetschen into Prussian territory. Together with its tributaries, the Adler, the Iser, the Moldau, the Eger, and others of minor importance, the Elbe drains the whole country, which thus forms the upper portion of its basin. The *climate* is generally healthy, while cold as compared with other parts of the empire, and the soil is remarkable for its fertility.

Mineral springs are plentiful. Some of the best known are at Carlsbad, Teplitz, Marienbad, and

Franzensbrunn, all of which are much frequented by invalids seeking a "cure" from their waters.

Population. At the end of 1900 the number of inhabitants was 6,318,697. Of these 96 per cent. were Roman Catholics, 2·15 Protestants, and 1·7 Jews.

Education. Of public elementary schools (Volks- und Bürgerschulen) there are about 5,000, besides some 300 private schools. The number of teachers employed is about 19,500, of whom 4,500 are women. The attendance of children of school age reaches as high as 98 per cent. German is the language used in a number of the schools; but the majority employ the "Czecho-Slav," which is still the mother-tongue of the Bohemian people. The schools of handicraft (Gewerbeschulen) number more than 200, with about 25,000 scholars; these figures are considerably higher than those of any other part of the Austrian dominions. There are schools for the study of agriculture of various kinds. The "middle schools" comprise "Gymnasien" and "Realschulen," some of them being maintained by the State, and the remainder by their respective communes, with the exception of two "Gymnasien" supported by the clergy, and one private "Realschule." In Prague are technical high schools for German and Bohemian-speaking pupils.

The University of Prague is among the oldest and most renowned in Europe; it was founded in 1348 by the Emperor Charles IV. At the beginning of the fifteenth century it had upwards of ten thousand students, but subsequently it underwent a long period of decay. In 1881, it received a new constitution. Like most other educational foundations in Bohemia, it has distinct establishments for the two languages. On the German side there are 152 professors and teachers, with about 1,400 students; on the Bohemian side, 228 professors, etc., and about 3,500 students. It possesses a library of nearly 200,000 volumes, and about 3,800 manuscripts, a fine observatory, museums of zoology and anatomy, and a botanical garden. The University has played a prominent part in some of the most stirring scenes of European history.

There are four theological colleges in Bohemia, and a number of training colleges for male and female teachers.

History. The early history of Bohemia is obscure, and probably, in part at least, mythical. The name is derived from the *Boii*, the first inhabitants of whom we have any record. They are said to have been of Keltic race, and to have been supplanted in the time of Augustus by the Marcomanni, and the chief opponents of Marcus Aurelius in Germany.

Early in the eleventh century Boleslaw Chrobly, Duke of Poland, conquered Bohemia, but after struggling for fourteen years against the Emperor Henry II., he was compelled to give up his claims and to do homage to the Emperor.

Charles the Great (Charlemagne) subdued, among other inhabitants of the lands on his eastern borders, the Czechs, who then dwelt in Bohemia.

Frederick Barbarossa raised Wladislaw, Duke of Bohemia, to the rank of king, as a reward for faithful services.

About the year 1230 we find Ottocar, King of Bohemia, taking part with the knights of the Teutonic Order in their singular crusade against Prussia. A granddaughter of this king became the wife of John of Luxemburg, son of the Emperor Henry VII., in whose family the crown remained for several generations. Charles, the son of King John, was elected emperor, as Charles IV. Though not altogether successful as emperor, he was one of the best of the kings of Bohemia, and devoted much care to the improvement of Prague, where he founded a university; he died in 1378.

In 1415 occurred the burning of John Huss (q.v.), and, in the following year, Jerome of Prague, another preacher of Wyclif's doctrines, shared the same fate. These events caused intense excitement, which culminated in the outbreak of the Hussite war (1419). This sanguinary conflict was carried on for fifteen years. The Protestant party gained many victories under their leader, the blind General Zisca (q.v.), and his successors, but were finally defeated, and the war terminated, by Meinhard of Neuhaus, at Lippau, in 1434. Sigmund, the persecutor of the Hussites, was then acknowledged as King of Bohemia; he had been crowned emperor in the preceding year.

In 1458 George of Podiebrad was elected king, and for some time held his own against Matthias Corvinus. His successor, Ladislaus, a Polish prince, was elected King of Hungary, thus uniting the two crowns. On the death of his son Louis, who fell fighting the Turks, at Mohacz, in 1526, the Archduke Ferdinand, son-in-law of Ladislaus, and brother of the Emperor Charles V., was elected and crowned king, and from thenceforth the throne was always occupied by the imperial house of Austria.

Disturbances on account of religious persecutions led, in 1618, to the outbreak of the Thirty Years' war, in which Bohemia suffered to an extent out of all proportion to its area. After the great defeat of the Bohemians at Weissenberg (the White Hill), near Prague, in 1620, Ferdinand II. visited his wrath upon the conquered country in a fashion without precedent in modern history.

On account of its geographical situation, in the very midst of the rival German and Austrian states, Bohemia has been the scene of much fighting. As an instance, it may be noted that Prague, after being three times taken and retaken during the Thirty Years' war, has since been besieged or occupied no fewer than five times. The last occasion was at the close of the Austro-Prussian campaign, in 1866, the decisive victory which was gained by the Prussians on Bohemian soil, at Königgrätz.

Industries. Coal-mining employs nearly 40,000 persons, and more than 5,000 are at work in iron mines and works. Farming is fairly prosperous. More cattle are raised here than in other parts of the empire, but sheep-farming does not seem to have advanced of late years.

Woollen, cotton, and linen goods are manufactured; the last in considerable quantities.

Bohemian glass has long enjoyed a deservedly

high reputation. Its production gives employment to some 3,500 families, living, for the most part, on the wooded slopes of the Böhmerwald mountains. There are seventy-five glass houses, and twenty-two grinding and polishing mills. The principal centres of this manufacture are Liebenau, Adolfshütte, Gablonz, Silberberg, Georgenthal, and Defereck. Most of the polishing is done at Leitmeritz.

Brewing is carried on in more than 700 establishments, whose combined output is stated to amount to 43 per cent. of the total production of beer in the empire. 31 per cent. of Austrian brandy also comes from Bohemia.

The beetroot sugar industry is almost confined to Bohemia, which produces two-thirds of the total annual amount, and has 36,000 workpeople employed in about 130 factories.

Inhabitants. The Marcomanni (*see* above) were in their turn expelled by the Slavs, who still form the majority of the population (3,600,000). The other chief element is the Germans (2,150,000), which with about 100,000 Jews and others make up the present population of 6,318,697, taken by census on Dec. 31, 1900. The Germans are found in more or less numerous communities in every district except that of Tabor, but they form a compact body only in the three north-western districts of Eger, Saatz and Leitmeritz. At one time Bohemia seemed destined to become completely Teutonised, the Slav population being reduced at the close of the 18th century to the last stage of national degradation. But since then a remarkable revival has taken place, and the Czechs or Chekhs (Tsekhs), as the Bohemian Slavs are called, have completely recovered their ascendency both in a political, literary, and social respect. [CHEKHS.] The "Young Czechs," the advanced section of the Nationalist party, in 1890-91 actively agitated for the restoration of the Bohemian kingdom and the complete political separation of Bohemia from Austria, the Emperor of Austria to be King of Bohemia as he is King of Hungary.

Bohemian Brethren were composed of remnants of the Taborites or extreme sect of the Hussites. These had formed themselves into an organised body, called the United Brethren, in 1455, and at one time numbered some 200 communities in Bohemia. They were broken up by the Thirty Years' war, when the Protestants were expelled from that country, but afterwards met in secret, and in 1722 were permitted by Count Zinzendorf to settle on his land in Saxony. From this time they were called Moravians or Herrnhuters.

Bohemond, Prince of Antioch, and son of Robert Guiscard, was a celebrated warrior of the beginning of the 12th century (died 1111). Trained in arms by his father, and following him in his wars, he imbibed all his enmity for the Greeks and their Emperor Alexis. At Robert Guiscard's death, Bohemond declared war against his brother Roger, the heir, and forced him to give up the principality of Tarentum. He, with his relative Tancred, joined the crusade of Godfrey de Bouillon, and having failed to persuade the latter to make war upon Alexis, he managed to take Antioch and to be nominated prince of it, a title which remained in his family for 190 years. After a two years imprisonment among the Saracens, he married Constance, daughter of Philippe of France, and by aid of the French king made war upon Alexis. At length the plague in his army forced him to make conditions, and Anna Comnena has left us her impressions of him as she saw him at a conference. She was greatly struck by his fine appearance, in which something terrible was mingled with a charming sweetness. He was meditating another war against Alexis when death overtook him.

Bohn, HENRY GEORGE (1796-1884), publisher. Starting as a secondhand bookseller, he turned his attention to rare books, of which he soon possessed a great quantity. It was in 1846 that he began to issue the series of publications that has made his name famous. This series contained in all about 600 volumes. He also edited several other valuable works and translations, and had made considerable and interesting collections of china and objects of art.

Bohun, a Norman family founded by Humphrey de Bohun, whose descendant in 1199 became Earl of Hereford. In 1380 the heiress of this earldom together with those of Essex and Northampton, married Henry Bolingbroke, afterwards Henry IV.

Boiardo, MATTEO MARIA, a celebrated Italian poet, born 1430. Trained at the university of Ferrara, and being well read, especially in Latin, Greek, and Oriental languages, he became doctor of law and philosophy, and had the reputation of being one of the most learned men of his day, as well as an accomplished courtier. Becoming a soldier, he was appointed to important posts by the Dukes of Ferrara, among others to that of governor of Reggio, which he retained till the end of his life. His most celebrated work is the *Orlando Innamorato*, in 69 cantos, first published in 1495. This poem marks an epoch in Italian literature as being the most striking of the Romantic poems before the time of Ariosto. Its subject is the supposed siege of Paris by the Saracens; and introduces us for the first time to the Agramants and Astolfs and other typical personages. Ariosto's continuation of the poem as *Orlando Furioso* and the recasting of it by Berni have had the effect of putting the original into the background. Among the other works of Boiardo are *Carmen Bucolicon* (1500, 4to), *Sonnetti e Canzoni* (1499, 4to), *Timon* (a five-act comedy, 1500, 4to), and an Italian translation of the *Golden Ass* (1523, 8vo).

Boieldieu, FRANÇOIS ADRIEN, born at Rouen 1775, died 1834, a French composer of note. His musical talent having been remarked by Broche, organist of Rouen cathedral, this latter took charge of him and of his musical education. The master's severity drove the child to run away, and it was not till after four days that inquiries led to his being found on the road to Paris and to his being brought back. Returning to Broche, he soon after became enamoured of the theatre, and when he had not money enough to pay for his seat at the opera, he used to slip into the theatre, and remain hidden all day. He was one day discovered, and the director, learning

who he was, made him free of the theatre. In 1793 he produced a piece at the theatre at Rouen, and its success led him to go and try his fortune in Paris. After many vicissitudes, he saw represented in 1801 the first of his popular operas, *The Caliph of Bagdad*. His most celebrated work is *La Dame Blanche*, the production of which, in spite of his habit of repeated revision and rewriting which made the appearance of his pieces a question of years, was finished, rehearsed and played in the space of twenty-one days.

Boii, a powerful Keltic people, originally said to have been settled in Gaul. At an early period they migrated in two great swarms—one to Germany, which is said to have given its name to Bohemia, the other to the district in North Italy, between the Po and the Apennines, where after a long struggle with the Romans, which indirectly had much influence on the course of the Second Punic war, they were finally subdued in 191 B.C.

Boil, a localised inflammation of the skin and subcutaneous tissue, usually in connection with a hair follicle or with one of the cutaneous glands. Boils are frequently found in situations which suggest that friction has played a part in their production, as on the neck where the collar rubs against it, or on the forehead where the hat exerts pressure. The buttocks and back form occasional sites of boils. They occur by preference in young adults and during the spring, and often indicate "poorness of blood," as in diabetes and albuminuria, or result from errors of diet or faulty habits of life. A boil commences as a small painful induration of the skin, which subsequently suppurates and bursts, discharging a "core" of dead tissue. If the boil disappears without reaching the stage of suppuration it is called a "blind boil." Micro-organisms can usually be detected in the matter of a boil, and possibly they form the real source of mischief in many cases. A boil may sometimes be checked by counter-irritation; as a rule, however, the best local application to employ is a poultice. The most important matter, however, is to look for hygienic defects which may constitute the origin of the trouble. Regulation of diet and exercise, and the administration of tonics, are indicated. Crops of boils are sometimes associated with faulty drains.

Boileau, NICOLAS (1636-1711), French critic, born at Paris. He studied both law and theology, but on coming of age and inheriting property he abandoned both for literature. In French literature he holds a well-defined place as having on the one hand reduced versification to rule, and as having polished and refined both prose and poetical styles; and on the other as having robbed French poetry of much of its fire and power, and having cramped and crippled French drama and given it a stilted, artificial character. His *Art Poétique* is founded upon the *Ars Poetica* of Horace, and aims at doing for the French language what Horace's essay did for the Latin. Pope's essay on *Criticism* is an imitation of this, just as *Le Lutrin* gave Pope a model for the *Rape of the Lock*. Among his works was a translation of Longinus on the *Sublime*, and his satirical prose *Dialogue des Héros de Roman* gave a deathblow to the elaborate romances of the time upon which they were a satire. The first piece that showed his peculiar powers was *Adieux d'un Poète à la ville de Paris*. Boileau obtained the favour of the king, and was associated with Racine as court historiographer, as well as being the recipient of several pensions. On the whole his mission appears to have been to serve as a sort of sieve or filter for purifying and arranging the flood of new ideas and works that the 16th century had brought into France.

Boiler, in *Mechanical Engineering*, is a vessel for the generation of steam from water, and is an essential accompaniment to every steam-engine. The build of the boiler depends on the pressure at which the steam is to be produced, on the position it is to occupy, on its being stationary or locomotive, on the nature of the water supplied and of the coal burnt in the furnace, and on other circumstances. Hence the different types of boiler are very numerous, and definite classification is difficult. The efficiency of the boiler is measured by the number of pounds of steam generated per pound of coal employed in the furnace. The coal, or other fuel, should therefore be burnt efficiently, and the boiler should have a large surface in contact with the furnace, the hot gaseous products of combustion passing off to the chimney. The intensity of *natural* draught is regulated by the height of the chimney, but if this cannot be made sufficiently great, a *forced* draught is effected by injecting the exhaust steam into the chimney through a contracted nozzle. This we have on an ordinary locomotive, where the chimney cannot be made very long.

The Cornish and Lancashire boilers are the most common forms used for stationary engines. The *Cornish* boiler is a horizontal cylinder, through which runs another of three-fifths its diameter. A part of the front end of this inner tube is arranged as a furnace, terminated by a transverse *bridge*, of fire-brick or hollow metal, towards which the fire-bars slope downwards from the front. The steam of hot gases passes along the tube or *inside-flue* to the end, then through external flues in contact with the outside of the boiler, and then up the chimney, at the lower end of which a *damper* is placed to vary the draught when required. In the *Lancashire* boiler there are two long internal flues instead of one passing through the shell, the diameter of each being two-fifths that of the shell. *Galloway tubes*, forming passages for the water from one side of the flue to the other, possess the advantages of increasing the heating-surface, producing beneficial eddies in the flow of gases, and of considerably strengthening the flue. The same advantages are partially gained by the use of corrugated flues.

If instead of one or two large flues a number of small tubes are employed, we have a *multitubular* boiler, much stronger, having much more heating surface, but more expensive than the simpler form. Such boilers are extensively used for locomotives, marine-engines, and other cases where compactness and economy of fuel have to be considered together.

For many small purposes vertical boilers are employed; they are generally tubular. *Water tube* boilers, owing to their safety in use, economy in fuel and quick steam-raising capacity, have come into general use of late years for factory service. They have been tried for marine purposes, but with indifferent success.

Boilers are built of plates of mild steel or of wrought-iron, the first being much more extensively used now than formerly, as it may be produced cheaply and of fairly uniform quality. Steel boilers are as strong as wrought-iron boilers of about 1⅝ times the thickness, and may therefore be made thinner. The fire-box of a locomotive is made of copper, the tubes of copper, brass or iron.

The chief boiler accessories are the *dome*, which gives additional steam-space and enables dry steam to enter the steam-pipe, which opens here; the *manhole*, an opening to the boiler, closed by a tight-fitting bolted cover, for a man to enter when cleaning out or repairing is required; the *blow-off cock*, near the bottom of the boiler, for the discharge of muddy water and sediment; the *feed water pump*; the *pressure-gauge* for showing the pressure of the steam within the boiler, this pressure varying in different cases from 30 to 150 lbs. per square inch; the glass *water-gauge*, to show the level of the water within; and the *safety-valve* to provide an exit for the steam when its pressure exceeds a certain limit. [STEAM, LOCOMOTIVE, MARINE-ENGINES.]

Boiling, or ebullition, signifies the transition of a substance from the liquid to the gaseous state. As the temperature of the liquid rises, its particles as a rule exhibit a greater inclination for free motion, till at last a temperature is reached when the vapour pressure within the liquid is sufficiently great to overcome the external pressure. This temperature is called the *boiling-point* of the liquid at that particular pressure. Bubbles of vapour then begin to form in the liquid; they pass to the surface unless cooled by transit through colder layers of the liquid, and are given off as gas into the air. It is evident that the temperature at which this takes place must depend on the external pressure, the one increasing with the other. Thus, water at ½ atmosphere pressure boils at 82° C., a fact that may be verified by placing a vessel of water at this temperature within the receiver of an air-pump, and gradually diminishing the pressure therein. Water under 1 atmosphere pressure boils at 100° C. or 212° F.; and under 2 atmospheres, at 120° C. The connection between the boiling-point and pressure is known accurately for water by experiments of Regnault. Thus, by determining the boiling-point of water we can estimate the external pressure, a principle employed for the measurement of heights by the hypsometer (q.v.).

The following are the boiling-points of the more important liquids:—

Sulphurous anhydride	8·00° C.
Ether	34·89
Carbon bisulphide	48·05
Acetone	56·28
Bromine	63·00
Wood-spirit	65·50
Acetic ether	73·83
Alcohol	78·39 C.
Benzole	80·44
Water	100·00
Acetic acid	117·28
Sulphuric acid	337·77
Mercury	350 00

Boisgobey, FORTUNE DU, born in 1824 at Granville in Normandy. After several campaigns as army paymaster in Algeria, he tried his fortune as a novelist and made his début in the *Petit Journal*. His sensational stories, which are in some respects modelled upon those of Gaboriau, but do not approach the dramatic fitness and keeping of the latter, have achieved a certain amount of popularity even in England, where translations have appeared. Some of his works are:—*L'Homme sans Nom*; *Le Forçat Colonel*; *L'As de Cœur*; *Les Mystères de Nouveau Paris*; *Le Crime de l'Opéra*; and *Le Secret de Berthe*. **He died in 1891.**

Bois-le-Duc, a town of Holland, chief town of the province of North Brabant, arrondissement and canton, 45 miles S.E. of Amsterdam, at the confluence of the Aa and the Dommel. The town is protected by a citadel, and the neighbouring country can be easily laid under water. Founded in 1184 by Godfrey, Duke of Brabant, upon the site of a hunting-lodge in the midst of a wood, it was called Hertogen's Bosch, from which the French Bois-le-Duc. It was enlarged by Philip the Good (1453), taken by the Germans (1629), occupied by the French (1794), and restored to Holland (1814). The early 12th century Gothic cathedral (Johanniskirche) is one of the finest churches of the Low Countries, and the Hôtel de ville, designed by Van Campen, has a fine set of chimes. The industries of Bois-le-Duc are varied and considerable, and it possesses an arsenal. Erasmus attended the school here.

Boisserée, SULPIZ, 1783-1854, German architect and antiquary. Together with his brother Melchior he made a magnificent collection of German pictures. This collection he sold in 1827 to the King of Bavaria for 120,000 thalers, and it is now in the picture gallery at Munich. MELCHIOR BOISSERÉE, brother of the above (1786-1851), discovered the means of painting on glass with the brush alone, and has copied by this process the best of the pictures above mentioned.

Boissonade, JEAN FRANÇOIS, Greek scholar and French man of letters (1774–1857). His early education was disturbed by the revolution. Although belonging to the aristocratic party—of which, however, he retained nothing but the elegance and politeness—he obtained employment under the republican government, losing it, however, under the suspicion which his aristocratic birth brought upon him. Nominated again to political employment by Lucien Bonaparte in 1801, he soon entirely abandoned politics for letters, and devoted himself more particularly to grammar.

Boissy d'Anglas, COMTE DE (1756–1826), French statesman. Boissy D'Anglas has gained to some extent the reputation of being a political trimmer, but it may be questioned whether he was not steady to his own principles throughout.

Already a barrister, he was a moderate supporter of revolutionary ideas, and his views as to religious freedom gained for him at the hands of the royalists the accusation of wishing to establish a Protestant ascendency. As procureur syndic of the Ardèche he showed much courage in defending some Catholic priests. As a member of the National Convention he was opposed to the execution of the king, and he joined the silent party during the Terror. He came to the front again after the fall of Robespierre, and earned much popular odium for his mismanagement of the measures undertaken for relieving Paris during a scarcity which was called in ridicule the "Boissy Famine." He gained some reputation for the dignity with which at the Convention, during an inroad of the populace, he sat, said an eyewitness, "like the Roman senators who awaited death in their curule chairs." He served under Napoleon, under Louis XVIII., again under Napoleon, and again under the king. As an orator and as an author he was but second-rate.

Boito, ARRIGO, Italian composer and poet. Born at Padua 1842. Besides writing his own librettos, he has published songs, novels, and lyrical dramas. After studying at the Conservatorium at Milan, he produced, but without success, in 1868 the opera *Mefistofele*. In this the influence of Wagner may be traced, and it has since grown more popular. He has also composed *Ero e Leandro*, *Nerone*, and *Oda all'Arte*.

Bojanus, THE ORGAN OF, is the name of the excretory gland of many mollusca.

Bokhara, a country and Khanate of Independent Tartary, between lat. 37° and 41° N., and long. 62° and 69° E. Its original proportions have been much reduced by Russian conquests in the north, and Afghan encroachments on the south. Its area is about 90,000 square miles, and its population is considered to be somewhere about two millions. Except in the neighbourhood of the river very little cultivation is possible, and the soil is composed of stiff clay, with here and there low sand hills. The most important of the rivers are three, the Amu or Oxus, which flows from S.E. to N.W., and varies in width from 300 to 800 yards, and finally empties itself into the Sea of Aral. The Zarafshan, the neighbourhood of which is more populous and more fertile than that of the Amu, rises in the highlands east of Samarcand, and used to form a large lake about 25 miles long in the province of Karakul. Irrigation works have, however, lessened the volume of the lower course to fertilise the valleys of the upper, and the river now loses itself in the sands, as does also its northern branch. The Karshi, too, loses itself in the desert after a course of about 60 miles. The climate of Bokhara varies from about 100° F. in summer to frosts in winter, which freeze over the Amu so as to allow of the passage of caravans over the ice. Earthquakes and violent storms and tornadoes are not infrequent. Though the sands of the Oxus yield gold, minerals are generally scarce. Alum, sal-ammoniac, salt, and sulphur are found. Rice, cotton, wheat, barley, beetroot, vegetables, hemp, silk, and tobacco are among the products; and fruits are abundant. Sugar is manufactured from the camel thorn. The horses of Bokhara are celebrated for strength and endurance, and the asses are large and sturdy; and a great number of sheep and goats are reared. The mulberry is abundant on the banks of the rivers, being planted for the use of the silkworms. Bokhara has the transit trade between Russia and S. Asia, and the Transcaspian railway will develop still more its commercial resources. Conquered in the 8th century by the Arabs, and passing through various hands in the succeeding centuries, Bokhara became a coveted object to England and Russia in 1826. But Russia has gained the ascendency, and the country seems likely before long to be absorbed in Russian Turkestan.

Bokhara, the capital, is in a fertile plain near the Zarafshan, and is surrounded by trees and gardens. Its circumference is about 9 miles, and it is girt by embattled earthworks about 24 ft. high, and having 11 gates. The town is the centre of the religious life of Central Asia, and is said to possess 365 mosques. The population is decreasing owing to the lessening of trade, which has followed upon the gradual drying up of the river. A canal passes through the town. There are manufactures of swords, silks, and woollens, and the bazaars are numerous. The Transcaspian railway connects Bokhara with Merv and the Caspian ports.

Inhabitants. Lying on the parting line between the Aryan and Tatar ethnical domains, Bokhara has for ages been occupied in varying proportions by representatives of both races. Although now inferior in numbers and position, the Aryans appear to be the primitive element; but for several centuries the Tatars have been the dominant class politically. The two elements present the sharpest contrasts in their physical appearance, speech, usages, pursuits, in fact in every respect except religion, all being Mohammedans, mainly of the Sunni sect. The Aryans, here called *Tajiks*, are sedentary, tillers of the soil, artisans and traders, of Persian speech; the Tatars, here called *Uzbegs*, are nomad pastors, residing in tents, devoted to stock-breeding and the military profession, and speak Tatar (Tûrki) almost exclusively. The Uzbegs with the kindred Turkomans number 1,700,000, the Tajiks with the kindred Persians and Afghâns 700,000. Other minor groups are the Arabs (50,000), Kalmucks (20,000); Kirghiz and Kara-Kalpaks (6,000), Jews (4,000), Gypsies (2,000). [TAJIKS and UZBEGS.]

Bolan Pass, a narrow, precipitous gorge between Sind and Candahar, and leading to the plateau of Dasht-i-Bidaulat, in Beloochistan. It rises 5,500 ft. in 55 miles, giving an average of 90 ft. per mile, its outlet and entry being 5,800 ft., and 800 ft. above sea-level. A torrent flows along the bottom of the pass, bridged in many places by a military road, and there is a railway 56 miles long. The road is bounded by cliffs, which in some places almost touch each other, and are in places 800 ft. high. In 1839 a British column marched through the pass in six days. Quetta, a British fortress 25 miles away, commands the road.

Bolas (Spanish *balls*), a weapon consisting of two (or sometimes three) balls of stone or metal connected by thongs or ropes, which are thrown at animals in such a way as to entangle their feet and bring them down. It seems to be a native Patagonian weapon, and is also used by the Gauchos of the South American Pampas.

Bolbec, a French town (Seine Inférieure), the head of an arrondissement and of a canton; on a river of the same name, 23 miles N.E. of Havre. The town has considerable tanneries and paper-factories, and there is much weaving and manufacture of calicoes, linen, flannel, and blankets.

Boletus, a genus of fungi belonging to the class *Hymenomycetes*, having a thick stem and rounded mushroom-like cap or pileus, on the under surface of which numerous tubes take the place of the gills of the mushroom. The tubes are very distinct both from the cap and from one another, and are lined by the hymenium, or spore-bearing surface. There are numerous species, *B. edulis* (with sulphur-yellow tubes) and others, being edible, whilst *B. Satanas* and others, with red tubes, are poisonous. In some the flesh rapidly turns to a deep blue when broken.

Boleyn, ANNE (1507–1536), second wife of Henry VIII. of England, daughter of Sir Thomas Boleyn and Elizabeth Howard, daughter of the Duke of Norfolk. She spent three years of her early youth at the French court, and on her return to England her hand was sought by Henry Percy. This match was broken off by Wolsey, probably at the king's suggestion, and the king himself began to woo her, she being then a maid of honour of Katherine of Aragon. She was already Henry's mistress, and kept almost the state of a queen when the divorce of Henry from Katherine of Aragon was pronounced in 1533. The Princess Elizabeth was born in September, 1533, Anne Boleyn having been crowned and publicly married in April of that year. In 1536 the birth of a still-born child roused the superstitious fears of the king and gave an impetus to his passion for Jane Seymour. The queen was arrested on a charge of adultery with divers people, including her own brother, and of conspiring against the king's life, and having been adjudged guilty, was beheaded on the 19th of May—those accused with her being also executed. The question of her innocence or guilt can never be settled, since none of the evidence remains. In answer to a proposal of Henry that she should confess on the chance of receiving pardon, a letter she wrote from the Tower strongly affirms her innocence. The fact that her father and her uncle were instrumental in her death does not prove that they believed in her guilt. Dread of Henry's anger and the fear of losing their possessions and lives may have been their governing motive. Little is known of Anne Boleyn's married life, further than that she countenanced the Reformers and interested herself in the translation of the Bible.

Bolingbroke, VISCOUNT OF (HARRY ST. JOHN), English statesman and political writer (1678–1751). His first appearance in Parliament was in 1700, when he ranged himself upon the Tory side. In 1704 he became Secretary of State, and was a minister for four years, until Horace Walpole and the Whigs came into power. The two years' interval that now followed was of the greatest service to him, as giving him leisure for perfecting by study and reflection his political and his philosophical principles. Queen Anne regretted her Tory Government, and intrigued with Harley and Bolingbroke for the return to power of the party. This was accomplished in 1710, and as Foreign Secretary, and fully convinced of the evils of continuing the war, Bolingbroke did not rest till he brought about the peace of Utrecht, in spite of opposition abroad, the weakness of the queen, and even the envy of his own colleagues. He went to France to negotiate this treaty—the crowning act of his political life—and was most flatteringly received by Louis XIV. The accession of George I. drove the Tories again out into the cold, and it is at this period that Bolingbroke entered upon the questionable course of joining the exiled Stuarts, and then turning them into ridicule. Allowed to come back from exile, and restored to his property, he descended again into the political arena so far as was in his power, and attacked Walpole in the famous letters which upheld the rights of the country against the oppressions of a ministry at once corrupting and corrupted. Death found him writing his *Reflections on the Present State of the Nation*. As a philosopher, though classed by many as an atheist, he was rather the exponent of that vague and indeterminate theism which was known later in France as "Voltaireism," and it is from the arsenal of Bolingbroke's writings that the writers of this school drew their most pointed and telling weapons. As a man of letters Bolingbroke held his own with Swift, and he gave his intimate friend Pope the idea of his *Essay on Man*, and is said to have aided him to carry it out.

Bolivar. 1. A state of Colombia W. of the Magdalena. Area, 21,345 sq. miles. The surface is low and swampy, and the climate in parts hot and unhealthy. Chief port, Barranquilla; capital, Cartagena.

2. One of the United States of Venezuela, stretching across the centre from Colombia to the Atlantic. Area, 88,383 sq. miles. Capital, Ciudad Bolivar.

3. A national territory of Colombia.

4. An agricultural settlement for emigrants in Venezuela; 30 miles N.E. of Caraccas.

5. A new territory of Buenos Ayres, 170 miles S.W. of the capital. Area, 2,070 square miles.

Bolivar, SIMON, surnamed "El Liberador," statesman and general—the Washington of South America—born at Caraccas (Venezuela) 1783. After studying at Madrid he travelled in Europe, and having imbibed the revolutionary principles which were triumphing in France he returned to his country with the determination to free it from Spanish domination. In 1812 he embarked on the war of Independence, taking service as colonel under Miranda. Failing at first, he eventually gained several victories over General Monteverde,

and finally drove him out of Venezuela. Made Dictator of this province, he had a severe struggle with the bands of slaves and brigands who infested it, and above all with the llaneros—those Tartars of the American steppes—whom the Spaniards had succeeded in enlisting against the cause of Independence, and it was not till 1819 that he was able to free New Granada and Venezuela and see them united under the name of the Columbian Republic, of which he was made President with dictatorial power. At the summons of the revolted Peruvians he drove out the Spaniards and set free Upper Peru, which now received the name of Bolivia, and the grateful Peruvians also made him Dictator. In 1824 the freedom of the South American Republics was consolidated by mutual alliances and by their official recognition by Great Britain, Holland, and the United States. In 1824 Bolivar summoned a congress of the States at Panama, hoping to form a powerful confederation of Republics. In this hope he was disappointed, and his latter days were embittered by the occurrence of internal struggles and factious struggles in Colombia, and the envy of his foes caused him to be accused of tyranny. Several times he laid down his dictatorship and was forced by the people to resume it; but at last, disgusted and wearied out by their caprices, he determined to resign it once and for all, and to leave his country. "The presence," said he, "of a successful soldier, however disinterested he may be, is always dangerous in a State that is new to freedom." He had already made all his preparations for departure when he died of fever at Santa Marta, 17th December, 1830. Perhaps Bolivar's greatest quality was his spirit of self-sacrifice. Far from reaping a rich harvest from the civil commotions, like many of his contemporaries, he lost his own patrimony by spending it for the State and turning his slaves into soldiers and citizens; and as Dictator, far from enriching himself, he reduced his own salary, and devoted the half of what remained to the widows and children of his dead comrades, and he also aided, with purse and influence, Mr. Lancaster in his efforts to establish his system of education in Colombia. As a soldier he was remarkable for his indomitable pluck and elasticity in reverses; and for his audacious rapidity of movement, and the various types of soldier over whom he held wonderful sway, he has not inaptly been compared with Hannibal. As a statesman he laid the foundation of Colombian credit and political power, and had it not been that his creative genius was far in advance of his country and his times, the lot of the South American Republics might have been a far happier and more united one than we see it now.

Bolivia, deriving its name from the statesman and dictator Bolivar, is a republican state in western South America; from 8° to 23° S. lat., and from 57° 30′ to 73° W. long., and enclosed by Peru, Brazil, Paraguay, the Argentine Republic, and Chili. The Argentine frontier is undetermined, and the coast provinces were added to Chili in the Peruvian war of 1879–83. Area, 605,400 sq. miles. Pop. 2,050,000. Formerly called Upper Peru, and being part of the viceroyalty of Buenos Ayres, Bolivia declared its independence, and adopted its new name in 1825. The constitution prepared by Bolivar, which it then adopted, has since been greatly modified. Its history has been a series of useless revolutions. The terms of peace with Chili not only deprived Bolivia of its sea-board, but also of its stores of guano and nitre, and included a heavy war indemnity. The state is divided into fourteen provinces; and the seat of the government, formerly at La Paz, is now at Sucre. The chief towns are La Paz (79,000), Cochabamba (24,512), Sucre (23,416), Potosi (23,450).

The executive government is entrusted to a President (constitutionally to be elected every four years—a provision seldom attended to), two Vice-Presidents, and two Chambers—the Senate and the House of Representatives—elected by universal suffrage. The ministry is divided into six departments. The Andes proper no longer form part of Bolivia, but are the western boundary; but it contains the lofty plateau of Oruro, averaging 13,000 ft. in height, and having 150 miles breadth, and includes the volcanoes of Sahama, Illampu, and Illimani, over 21,000 ft. high. Of the two parts of the great plateau, the northern is the more populous, owing to the presence of Lake Titicaca, and of well-watered valleys around it. Lake Titicaca has an area of 3,200 sq. miles, and is 720 ft. deep, and contains several islands, the largest of which was the original home of the Incas. Lake Titicaca is connected with the salt lake and swamps of Paria by the Rio Desaguaders, 160 miles long; and to the west is the Laguna de Soiposa, which is covered in the dry season with a crust of salt. The southern table-land is a desert, where the streams alternately flood the pampas in the rainy season, and lose themselves in the sand in the wet one. On the north, the Cordillera Real system, with the peaks of Illimani (21,300 ft.) and Sorata (24,800 ft.) reaches above the line of perpetual snow, while in the east it forms a series of terraces, which sink gently to the plains of Eastern Bolivia, which belong in the north to the basin of the Amazon, and in the south to that of La Plata, both of which rivers have their feeders in this district, the Rio Grande, which, uniting with the Beni, forms the Madeira, and the latter the Pilcomayo, which through the Gran Chaco forms the Paraguay. The plateau of Titicaca is the highest in the world except that of Thibet, and yet unlike this which has only mountainous sheep-runs, the former has populous cities, bounteous crops and harvests, and numerous herds of cattle and flocks of sheep. Although it is within the tropics, its variety of elevations gives Bolivia a great range of climates and productions. The districts over 11,000 ft. are called punas, and the region of snow and ice over 12,500 ft. the puna brava. The climate of this region, owing to the rarity of the atmosphere and to the winds, is cold and dry but healthy, with scanty vegetation of coarse grasses, barley, and potatoes. The rainy season is from November to March. The heads of the valleys descending to the lowlands vary in climate from temperate to sub-tropical, and the productions have a corresponding variation from wheat and maize to tropical fruits. The plains

below the 5,000 ft. limit lie east of the inner Cordillera, and are called yungas. These are well-watered, and have a luxuriant vegetation, with fine forests in the north and wide savannahs in the south. Most tropical productions are to be found here, and the copal and caoutchouc trees abound. The overflowing rivers and swamps of the north give rise to fevers. The rainfall is uncertain. The alpaca, guanaco, llama, vicuña, and the chinchilla are abundant in the punas. The fauna of the east is the same as that of Brazil, and includes jaguars, pumas, tapirs, and other wild animals. Besides being valued for their skins, the three first-named animals are useful beasts of burden. Chinchilla skins are a valuable article of commerce, and the vicuña yields a long, fine wool. The highlands abound in sheep, and the lowlands in herds of cattle.

But most attention has been given to developing the mines of Bolivia, and although transport is difficult, great profit attends the working of the gold, silver, copper, and tin. Potosi, which is said to have produced since 1545 over six hundred millions sterling, still produces 650,000 oz.; Oruro nearly 2 million, and Huanchaca more than twice that amount. The silver mines in all are calculated to produce over £3,000,000 a year. Gold mining is abandoned, but a little is washed out of the rivers at the foot of the Cordillera Real. The copper mines produced 2,877 tons in 1908, and the tin mines 29,937 tons.

The difficulties of transport present great obstacles to foreign trade, but there is now some prospect of railways being largely used to enable Bolivia to have her own Pacific trade. The great need for the country is a stable government and a steady credit. The present amount of the public debt is unknown, and is variously estimated, and of the revenue two-thirds is expended on the standing army. Much attention and capital are being bestowed on the coca and cinchona plantations, which seem to promise well.

The population of Bolivia is much mixed, and about one-third of it live in the cities. Besides half-castes, and descendants of the former negro slaves —slavery was abolished in 1836—there are the Indians, who are divided into three classes—the civilised Indians, who are descended from the Incas, and have 50 per cent. of pure blood; the semi-civilised Indians of the north-east llanos, who retain part of the 17th century civilisation of the Jesuits; and the wild Indians, who, though hating the Spanish race, are comparatively harmless. It is to the half-breeds of Spanish and Indian blood that Bolivia chiefly owes her independence. The religion is Roman Catholic, but tolerance of other religions prevails. There are four dioceses. Free primary instruction is under the care of the municipalities. There are four universities and several institutions for secondary instruction.

Bolkhof, town of Russia in Europe, on the Nougra, in the government of and 30 miles N. of Orel, head of the district of Bolkhof. The chief industries are tanning, and trading in leather, hemp, and tallow.

Boll (possibly a Scandinavian word), a local measure of grain; usually in Scotland six imperial bushels, but in England varying from that amount to two imperial bushels, or 16 gallons (the "new boll"). A boll of flour is a measure of weight = 140 lbs.

Bologna, a province of North Italy; area, 1,385 square miles. It is a fertile plain watered by tributaries of the Bologna, and separated from Tuscany by the Apennines. Besides abundant crops of rice, barley, wheat, pulse, hemp, flax, olives, grapes, figs, almonds, chestnuts and other fruits, the province abounds in cattle, and swine. Great numbers of silkworms are also reared.

Bologna, an ancient city of Italy—the *Felsina* of the Etruscans, and the *Bononia* of the Boii —which the Romans took and colonised 189 B.C. After the fall of the empire it belonged successively to the Longobards and the Franks, and Charlemagne made it a free city. Becoming a papal possession, it was taken by the French in 1796, and formed the capital of the Cisalpine Republic. Reverting to the Pope in 1815, it was taken by the Austrians in 1849. In 1860 Bologna voted by an overwhelming majority for annexation to the kingdom of Italy.

Bologna is on a plain at the foot of the lower Apennines, 82 miles N. of Florence and 135 miles S.E. of Milan. It is an irregular hexagon of 5,026 yards round, enclosed by a high brick wall with twelve gates. The canal of Reno passes through the city, and the rivers Reno and Savena flow by it. The older part of the town has narrow, dirty streets, but the newer parts are well built and well paved, and are sheltered from the weather by colonnades. There are fine palaces rich in fresco paintings of the great masters, especially the Palazzo Pubblico and the Palazzo del Podestà. The latter contains the city archives, and was the prison of Enzio, son of the Emperor Frederick II. Bologna contains more than 70 churches, of beautiful architecture and rich in art-treasures. The largest, San Petronio, has many great sculptures and pictures, and a meridian traced on the floor by Cassini the astronomer. San Stefano is rich in Madonnas and Byzantine frescoes of the 11th and 12th centuries. San Domenico has the tomb of the founder of the Order, ornamented by Michael Angelo; and St. Peter's cathedral has many works of art. There are two leaning-towers in the centre of the city, one 272 feet high, the other 138 ft.; one inclining 3½ ft., the other 9 ft. The university of Bologna claims to be the oldest in Europe, and to have been founded in 425. As a law-school it dates from the 11th century. It is noted as having been a great school of anatomy, and as having for ages had female professors. Galvani was a professor here. Rossini studied at the academy of music here. There is a fine university library containing rare MSS., and a large city library. The Academy of Fine Arts—once a Jesuits' college —has a fine collection of paintings, chiefly of the Bolognese school, which takes its name from the town. Besides its sausages, its soap, and a kind of confection, Bologna manufactures crape, glass, paper, silk, and wax candles. Domenicho, Guido

Reni, the Caraccis, Benedict XIV., and seven other popes, and numerous cardinals, were born here.

Bologna Phial, a short, narrow glass vessel open at one end only, made by the glass-blower to enable him to judge of the quality or material of the glass he is about to use. Being unannealed and suddenly cooled it is very friable, and though it will stand a fall on a brick floor, it will fly to pieces if a small hard body is dropped into it.

Bologna Stone, natural sulphate of Barium ($BaSO_4$), by partial reduction on charcoal gives a phosphorescent mass of sulphide and sulphate of Barium, known as Bolognian phosphorus.

Bolometer (Greek *bole*, ray ; *ballein*, to throw; and *metron*, measure ; also called actinic or thermic balance), the invention of an American, Professor S. P. Langley, in 1881, for measuring very minute amounts of radiant heat. A strip of platinum forms one arm of an electric balance. Change of temperature in this, even if extremely minute, alters the degree of its electrical resistance, and the alteration is then registered by a delicate galvanometer. The instrument will indicate changes of temperature of less than ·0001° Fahr.

Bolsena, a small town in Italy, on the E. shore of the Lake Bolsena, and 15 miles N.W. of Viterbo, is prettily situated on a height which is of great geological interest on account of the curious assemblage of basaltic materials that compose it. Here it was that in 1263 the miracle, painted by Raphael, of the Bleeding Host is said to have taken place. Bolsena is probably identical with Volsinium, an important Etruscan town where was a temple to the ancient cult of the goddess Nortia. Tiberius's minister, Sejanus, came from Bolsena.

Bolsena, LAKE, whose waters are emptied into the Mediterranean by the little river Marta, is thought to occupy the crater of an extinct volcano. Its waters are beautifully clear, and its shores are crowned with fine oaks, but the malaria prevents all habitation on them. Of two little islands in the lake, one has still the ruins of a little castle where the only daughter of Theodoric the Goth was imprisoned by her husband. The fish of the lake are renowned, and it was the excellence of its eels that caused Pope Martin IV. to be sent by Dante to purgatory.

Bolton, or BOLTON-LE-MOORS, a parliamentary and municipal borough, and manufacturing town of S. Lancashire, 11 miles N.W. of Manchester, and situate upon the river Croal, which divides it into Great and Little Bolton. Cotton and woollen manufactures, introduced by the Flemings of the 14th century, had already made it famous in Henry VIII.'s time. French and German immigrants introduced new manufactures, and the 18th century improvements in cotton-spinning gave great impetus to the trade. Arkwright resided in Bolton, and Crompton was born here, but it was long before the prejudices of the mill-hands would allow the adoption of the frame and the mule. Bolton now contains more than 100 mills, and about four million spindles. Its chief manufactures are fine calicoes, dimities, muslins, quilts, counterpanes, and the like ; and there are large foundries and iron-works, bleaching-mills dye-works, chemical works, and paper-mills ; and the neighbourhood is full of coal-pits. The public institutions are fine and numerous, and there is a park and recreation grounds. The water is brought from the hills five miles off, and rises by natural pressure to a height of 80 feet, and is in the hands of the corporation. A canal goes from Bolton to Manchester. The town was stormed in 1644 by Prince Rupert and the Earl of Derby ; and Ainsworth and Lemprière —of dictionary fame—were masters at the grammar school, founded here in 1641. Pop. (1901), 168,205.

Bolton Abbey, on the river Wharfe, 6 miles E. of Skipton, and 18 miles N.W. of Leeds, was founded for Augustinian canons (1150). The remains are Early English and Decorated. The nave of the church has been restored for service, and the old abbey barn is still used. The gateway—painted by Landseer—is now part of Bolton Hall. Bolton Abbey is familiar to most people from Wordsworth's *White Doe of Rylstone*, and *The Force of Prayer*, where the founding of the Abbey is said to have commemorated the death of young Romilly in the Barden Woods, where he was checked in a leap over the Strid by the hanging back of his greyhound, and was drowned.

Bolus, a term applied in pharmacy to a softened mass not too large to be swallowed whole. A pill on a magnified scale.

Bomarsund, a Russian fortress on the Island of Aland, Gulf of Bothnia. On June 21st, 1854, it was bombarded by the *Hecla*, *Valorous*, and *Odin* and after being further attacked by the British and French fleets, surrendered on August 16th, 1854, and was destroyed by the Allies. Russia was bound by the treaty of Paris not to restore it.

Bomb, in *Artillery*, a spherical iron shell, which being filled with gunpowder and fitted with a time-fuse, was fired from a gun or mortar, and exploded after the lapse of a given period. Spherical bombs such as were used up to about 1860, were of many sizes, but the following particulars concerning some of the more commonly used varieties will give some idea of the force of any such missiles :—

Diameter of Bomb, in inches.	Weight of Bomb, in lbs.	Usual bursting charge. lb. oz.
13	195	7 8
10	89	3 4
8	46	2 0

The modern term is "shell," the word "bomb" being applied to the hand-thrown contrivance used by criminals. In older warfare these small bombs were called grenades. [SHELL, MORTAR, etc.]

Bomba, IL RE, signifies *King Bomb*, or *King Shell*, and is the contemptuous name applied by the Italians to Ferdinand II., king of the Two Sicilies, as a reminder of his cruelties, and of the bombardments of revolted towns that took place under his orders, or at any rate during his reign.

Bombardier, in the British army, the name for a corporal of artillery.

Bombardier Beetles are a group of beetles belonging to several genera, such as *Brachinus* and *Aptinus;* their common name is derived from their habit when attacked of violently ejecting a drop of a stinking excretion accompanied by a slight report.

Bombardment, the throwing of bombs or shells at high angles into a fortress or other place in order to demolish it or to expel its defenders; or the battering down of defences by direct fire from heavy guns. According to the Declaration of Paris, the bombardment of open places—unless, indeed, they offer resistance—is at variance with the principles of international law. Military usage requires that due notice shall be given of the opening of a bombardment, in order that civilians may have an opportunity of retiring, but such notice is not obligatory. Neither is it likely that in warfare the provisions of the Declaration of Paris will ever be adhered to, if by bombarding an open place a commander believes that he can inflict a commensurate injury or annoyance upon the enemy.

Bombay, the western Presidency and Governorship of British India. Including Sind and Aden, it contains twenty-four British districts and nineteen feudatory States; area, 123,064 square miles; population, nearly 19 millions. Bombay is divided into two parts by the Nerbudda, the northern part being the alluvial plains of Guzerat, with the peninsulas of Cutch and Kathiawar; and to the south the Mahratta country, including parts of the Deccan, Carnatic, and coast-districts. The Portuguese have the small territories of Goa, Daman, and Diu, with an area of 1,062 square miles. The irregular coast-line is broken by the Gulfs of Cambay and Cutch, and there are several good natural harbours, of which Bombay and Kurrachee are the chief. The Indus waters and fertilises Sind; the Nerbudda flows west into the Gulf of Cambay, and the Subarmati and the Mahi flow through N. Guzerat. The Tapti flows through the Khandesh district into the sea above Surat. The hill streams which dry up during the hot season become torrents during the monsoons. The mountains run mostly north and south. The Khirthar Mountains are in the north; the W. Aravalli range in the south-east; and south of the Tapti the Western Ghâts run almost parallel with the coast. The Satpura range, running east, separates the waters of the Tapti from those of the Nerbudda. There are few minerals and no coal, though some iron is found in Dharvar, and there is a gold-producing quartz. The presidency derives its salt chiefly from the Runn of Cutch, which is about 8,000 square miles in area. There is good building-stone, lime, and slate. The mean temperature in Lower Sind is 98° during the hottest months, though in the dry sandy districts it sometimes reaches 130° in the shade. In Cutch and Guzerat the heat is slightly less; and the climate of the Deccan table-land is agreeable, except during the hot season. The coast districts have a rainfall in the rainy seasons of 300 inches, and are hot and moist. There is a bishop, and there are over 6,700 schools aided or inspected by the Government. There is a university, founded 1857, and there are many newspapers. The headquarters of the army is at Poona, and the province has now more than 3,500 miles of railway, the first Indian railway having been opened in India in 1853. There is a telegraph cable from Bombay to Aden, and Karachi (Kurrachee) is the headquarters of the Government Indo-European telegraph department. The cotton famine during the American Civil war gave a great impulse to the trade of Bombay, which now competes with Manchester in the Indian market, and exports its own manufactures. In 1907 there were in the presidency upwards of 3,922,000 acres under cultivation for cotton, and about 15,000 looms employed in weaving. Opium, wheat, and seeds are largely produced, and the Government draws a clear revenue of two millions from the opium trade. The other exports are chiefly drugs, woollen shawls, sugar, and tea; and the exports of Bombay and Sind to Great Britain amounted to over 15 millions in 1907. Among the imports are coal, liquor, machinery, metals, and there is a considerable trade in Arab horses. Ahmedabad, Poona, Surat, have silk-weaving; Ahmednagar makes carpets; leather-work and pottery are carried on in Sind; armour, cutlery, and gold and silver work are made in Cutch, and Bombay city, Nasik, and Poona are noted for brass-ware. The Hindu race forms an overwhelming majority in the population

Bombay, the town, occupies the breadth of the S.E. end of Bombay peninsula. It touches Bombay harbour on the E. and Back Bay on the S.W. The island, connected with the mainland by causeways and breakwaters, constitutes a district 11 miles long, 3 or 4 broad, and having an area of 22 square miles. The harbour is one of the finest in the world, and has 14 miles by 5 available for shipping. Bombay is European in appearance, having wide streets and extensive lines of tramway. Many bungalows and villas are built on the Malabar Hill, forming the western arm of Back Bay, and on Breach Hill, the continuation of the ridge to the north. Most of the inhabitants of Bombay are Hindus and Mohammedans, and the Parsees reckon next to the English in influence and position. Most of the public buildings are on the esplanade facing Back Bay. The G. I. P. railway terminus is a magnificent building which cost over £300,000. Other handsome buildings are the cathedral, the post-office, the university, etc. The old fort on the east of Back Bay is now only a garrison, the harbour being defended by rock-batteries and two ironclads. Of the extensive docks Princes Dock is the chief, and cost over a million. In 1905 the Prince of Wales laid the foundation-stone of a large one to be completed in 1911. The city water-supply is drawn from Vihar lake, 15 miles N. Bombay has become the chief Indian port for foreign trade, and her share of Indian trade as compared with Calcutta is as 42·78 per cent. to 36·9 per cent. The chief industries are cotton-spinning

and weaving, in which its competition is severely felt by Lancashire, and dyeing, tanning, and metal working. Pop. (1901), 776,006.

Bombay Duck (*Harpagon nehereus*), an East Indian fish of the family Scopelidæ. The elongated body is covered with thin transparent deciduous scales. These fish are natives of the Indian seas, and are taken in large quantities, salted, dried, and exported from Bombay and the Malabar coast. They are well known as a breakfast relish.

Bombazine, a rather fine twilled cloth made of a warp of silk and a weft of worsted, formerly often used as mourning, but now seldom made.

Bombproofs, in fortifications, buildings protected against shot and shell by earth and solid masonry, or sometimes by armour plates—the magazines and casemates (q.v.) of a fort, for instance.

Bombyx. [SILKWORM.]

Bona, seaport town of Constantine in Algeria, on a bay of the Mediterranean, near the mouth of the Sebus, 220 m. W. of Tunis. The town, which lies at the foot of a hill in a beautiful but unhealthy district, is divided into Upper and Lower Bona, and is defended by a citadel and several forts. The French occupation has much improved Bona, which has now a fair harbour. There is a telegraph cable to Marseilles. There are a Catholic church and a convent of Sisters of Mercy. There are manufactures of saddlery, tapestry, and burnooses and a commerce in coral, corn, hides, wax and wool. Near by are the ruins of Hippo, the see of St. Augustine.

Bona Dea, an Italian goddess, especially patronised by the women of Rome, who from very ancient times celebrated her rites, men being most rigidly excluded from all participation in them; and even the portraits of men being veiled. She was the goddess of fertility, and has been described as wife, sister, or daughter of Faunus. High-born vestals conducted her rites, which took place on the 1st of May at the house of the Consul. It was at Cæsar's house (in 62 B.C.) that Clodius took part in the rites disguised as a musician. Her sanctuary was a grotto on Mount Avernus, and the healing serpent was her symbol.

Bona fides. Good faith, *i.e.* honesty without fraud, collusion, or participation in wrong-doing—as opposed to *malafides* or bad faith. The phrase "want of good faith" indicates a kind of fraud which renders an agreement voidable between the parties to it, and it also indicates that sort of knowledge which disentitles one party to claim against the other, who would otherwise be liable to him. The term *bonâ fide* is often ambiguously applied. A *bonâ fide traveller* is one entitled to be served with refreshment within the prohibited hours under the Licensing Acts 1874, by section 10 of which it is enacted that "no person is to be deemed a *bonâ fide traveller* unless the place where he lodged during the preceding night is at least three miles distant from the place where he mands to be supplied with liquor; but althoug man is not a *bonâ fide traveller* unless he travelled the three miles, he does not necessa become so by merely having travelled the th miles."

Bonald, VICOMTE DE, publicist and ph sopher, 1754–1840. An aristocrat of the aristocr he became a Mousquetaire under Louis XV., stayed in the corps till its suppression in 17 Then quitting public life he retired to his nat place. In 1790, being then member of the Dep mental Assembly, he thought himself in hon bound to share the lot of the "Emigrés"; and established himself at Heidelberg, where he devo himself to the education of his two sons. Here wrote his theory of *Political and Religious Po in Civil Society*, a treatise which gives the keyn of his character, which remained unchan throughout his life. His theory was that p royalty and the Catholic religion are the indispensable conditions of society. He is perh better known as the consistent opponent of divo and the principal cause of its long disappeara from the French statute-book. Bonald was h in great honour both by the Bonapartes and the Bourbons. As a philosopher he is chiefly no for his theories that speech is innate, and t there is a medium between cause and effect.

Bonanza (Spanish *a fair wind, prosperity*) term originally applied in California to very r mines, afterwards to other lucrative enterprises.

Bonaparte (formerly written BUONAPARTE accordance with the Italian origin, until Napol decided in favour of the French orthography) the name of an Italian family which appears to h played a not inconsiderable part in Italian histc and one branch of which had established itself Corsica in 1612, when it was a leading patric family of Ajaccio. The most noted member of family is, of course, Napoleon (q.v.), who of all n had the least need of ancestry, but could say, am an ancestor myself;" albeit he has left posterity save his deeds. All kinds of fanci genealogies were created for him by his admir who traced him back to the Comnenus and Pal logus families of Greece, and legitimatised him a Bourbon by making him a direct descendant of Man in the Iron Mask. He himself stigmati these genealogies as puerile, and said that to a one asking the origin of the Bonaparte house, answer was very simple—"It dates from the 1 Brumaire." Napoleon had the courage of opinions. He thought that the world could not h too much of a good thing, and that the Bonapar were a good thing; so he practised nepotism o magnificent scale, and endeavoured to sup Europe with a full and complete set of Bonapa kings. This has given the other members of family an importance which they might not oth wise have possessed, and if they were not born gr they certainly had greatness thrust upon them.

From Charles Bonaparte, of Ajaccio, and Leti Ramolino, his wife, sprang five sons:—fi Joseph, sometime king of Spain; second, Napolec

third, Lucien; fourth, Louis, king of Holland; fifth, Jerome, king of Westphalia. To these may be added the names of three daughters—one of whom married Marat, king of Naples—and the Beauharnais whom Napoleon adopted on his marriage with Josephine, as making up the family group who have chiefly figured in the world. The father, Charles Bonaparte, after having come to Paris as a member of a deputation of Spanish nobles, and laid the foundation of his son's military greatness by obtaining his admission to the military school of Brienne, returned to Corsica in 1779, and died in 1785. Madame Bonaparte, who lived long enough to see the rise and the downfall of the dynasty, bore her good fortune with modesty and her reverses with dignity. In 1804, when her son was crowned, she received the title of Madame Mère, and a style and state suitable to the mother of the Emperor. "Who knows," she used to say in half-prophetic jest, "if I may not one day have to give all these kings bread?" After the second abdication of Napoleon she retired to Rome, accompanied by the sympathy and respect of all Europe, and died in 1836, in her 86th year. JOSEPH, the eldest son, after reading law at Marseilles, with a view to taking care of his younger brothers and sisters, was successively member of the Council of Five Hundred, French ambassador to Rome, and plenipotentiary to the United States; concluded the treaty of Lunéville with Austria 1801, signed the Concordat with the Pope, and the treaty of Amiens in 1802 with Lord Cornwallis. In 1805 his brother nominated him ruler of the two Sicilies, and in 1806 king of Naples, transferring him in 1808 to the throne of Spain. He was hardly the man for his brother's purposes, being much too humane, and after the battle of Vittoria he returned to his estates in France. After Waterloo he went to the United States, and became an American cititzen, returning to Europe a few years later. He is said to have lived for a time at Brettenham Hall, in Suffolk. He died in Florence in 1844. What his exact relations were with the Emperor is not quite clear. Some French writers consider that he could not submit to exclusion from the heritage, but this view is hardly consistent with the regard in which Napoleon held him, or with the constant devotion that Joseph showed to his brother's fortunes.

The third brother LUCIEN, born at Ajaccio in 1775, became a member of the Council of Five Hundred, and on the 18th Brumaire, as its President, he contributed much to Napoleon's success, but afterwards his republican notions and his marriage to a stockbroker's widow stood in the way of his advancement. He retired to his estate in Italy, where he enjoyed the friendship of the Pope, who made him Prince of Canino, and devoted himself to scientific pursuits and to art. He eventually died at Viterbo in 1840. Of his sons the eldest was the well-known naturalist and ornithologist; the second, Paul, died in 1827; the third became a linguist and literary man of world-wide reputation; the fourth, Pierre, created some sensation as well as embarrassment for his cousin Napoleon III., by shooting the journalist Victor Noir, in 1870. The affair arose out of a journalistic controversy. The Prince was tried and acquitted. He died in 1881; and the youngest, Antonio, died in 1883.

The fourth son of Charles Bonaparte was LOUIS, afterwards king of Holland, who died in 1846. His chief claim to notice lies in the fact that by his marriage to Hortense Beauharnais, the daughter of Josephine, he became the father of Napoleon III. (q.v.). Napoleon III.'s son, Napoleon Louis, Prince Imperial (q.v.), was killed by the Zulus, in a skirmish in 1879.

The fifth son, JEROME, king of Westphalia, was in his early life a sailor. He was perhaps a failure as a king, but was devoted to the Emperor, and fought by his side at Waterloo. A marriage that he made in America with an American lady was annulled by Imperial decree, and he afterwards married a daughter of Frederick, king of Würtemberg, and became (in 1822) the father of Napoleon Joseph Charles Paul, commonly known as Prince Napoleon, who fought in the Crimean war, and in 1859 married Princess Clotilde, a daughter of Victor Emmanuel. He died March 17, 1891. Able, cultivated, and intellectual, his notorious cowardice and his cynical disregard for ordinary conventionalities made his prospects of the succession hopeless, and when the Prince Imperial was killed in Zululand in 1879, he was passed over by the party in favour of his son Victor, the present heir of the Napoleonic dynasty.

There is a pretty story which reads like a prose idyll, and ought to be true if it is not, of a *curé*, a great uncle of Napoleon, who lived simply with his sacristan Tommaso, his god-daughter Mattéa, and his white hen Bianca, and refused, with true Napoleonic obstinacy, all attempts of the Emperor to draw him from his retirement.

Bonar, DR. HORATIUS (REV.), born 1808 at Edinburgh, and educated at the High School. He was ordained at Kelso (1837) to a ministry in the Free Church, and remained here for many years till he left it for an appointment to the Chalmers Memorial Free Church at Edinburgh. He is renowned for his *Hymns of Faith and Hope*, which are used extensively, and has published many other religious works. He has also edited the *Christian Treasury*, the *Presbyterian Review*, and the *Quarterly Journal of Prophecy*. He died in 1889.

Bonasia. [GROUSE.]

Bonassus, BONASUS. [BISON.]

Bonaventura, ST., a great mediæval mystic theologian (1221–1274), commonly known to his time as the "Seraphic doctor." His real name was John Fidenza. His name is said to be derived from an exclamation of his mother's—"O buona ventura!" at his almost unhoped-for recovery from a childish illness. At the age of 22 he became a monk, and went to study philosophy and theology at the University of Paris. In 1256 he became head of his Order, and showed himself a severe disciplinarian. In 1265 Pope Clement offered him the Archbishopric of York, which he refused, but in 1272 he accepted a Cardinal's hat from Gregory X., who summoned him to the council held in 1274 at Lyons, to bring

about a reconciliation with the Greek Church. During the session of this council, at which he made the opening speech, he died. He was canonised in 1482 by Sixtus IV., and in 1587 Sixtus V. decreed him a double. St. Bonaventura had a great share in advancing the cult of the Virgin; but his chief characteristic was his zeal for mystic theology. His central position was that knowledge of truth flows from a close union with God, and that this union is a return, so far as is possible, to the state of man before the Fall. This return, which is only to be arrived at by a life of purity, prayer and holiness, has three phases, which are, as it were, the three steps of a ladder. First, the footsteps of God, material objects, next His images, the intellect and the soul, while divine contemplation is the third step. We begin by studying things outside our self, then we enter into our own souls and examine them, and then we contemplate. Corresponding with these three steps, our nature possesses three faculties—sensibility, intelligence, and reason. The work setting forth these views is the *Itinerarium Mentis in Deum*. Another work, *Commentary on Peter Lombard's Book of Sentences*, contains some striking arguments for the immortality of the soul. A follower of St. Francis of Assisi, and having more than a tinge of Platonism, St. Bonaventura was more than half poet, and exhibits signs of being attached to those principles of evangelic socialism which seem to have been a special characteristic of the Franciscan order. He may, in some sort, be looked on, too, as a forerunner of St. Ignatius Loyola.

Bonchamp, CHARLES MELCHIOR ARTUS DE (1760–1793), a Vendean general who gained his first experiences of arms in the American War of Independence. At the outbreak of the revolution he was a captain in the Aquitaine regiment. He resigned his commission and retired into the country until duty called him to take place among the leaders of the Vendean movement. Although firmly attached to the principles of monarchy, and although a brave and skilful general, he appears to have entered on the struggle without any deep enthusiasm, and was in consequence sometimes accused of indecision by his colleagues. He received his death-wound at the battle of Cholet. Tradition says that just before death he learned that his soldiers intended to put to death 5,000 prisoners who were shut up in the Abbey of St. Florent, and that with his last breath he ordered that their lives should be spared. Whether true or not, this tradition has been perpetuated by a sculpture of David of Angers in the church of St. Florent at Bonchamp.

Bond. 1. SIR EDWARD AUGUSTUS (1815-1898), entered the British Museum in 1838, and from being keeper of MSS. became chief librarian in 1878. He did much useful work in the way of publishing catalogues and facsimiles of MSS., and was founder and president of the Palæographic Society, for which he edited facsimiles. He was LL.D. of Cambridge, and a C.B. Besides work of an antiquarian interest, he edited for the Hakluyt Society the *Speeches at the Trial of Warren Hastings*. 2. WILLIAM CRANCH (1789–1859), an American astronomer, who, then a clockmaker, had his attention turned to astronomy by an eclipse in 1806. He was one of the first American observers to announce the comet of 1811, and was later the first to employ photography as an instrument of astronomical research. In 1838 he was appointed to the duty of making a series of observations in the exploring ship commanded by Captain Wilkes. In 1840 he was appointed director of the observatory of Harvard College.

Bonded Warehouses are warehouses approved by the revenue authorities (in the United Kingdom by H.M. Commissioners of Customs or Inland Revenue) for the storage of dutiable goods. These may be deposited in them without payment of duty, and withdrawn gradually in small quantities, the duty being paid on each portion as it is taken out, or the goods can be re-exported without payment of duty at all. Thus merchants are able to transact their business with less capital than they would otherwise require, and the price of the goods to the public is not raised, as it would otherwise be, by the interest on such additional capital. The warehouse is under supervision by the revenue officers, and a bond is given by the warehouse keeper for exportation or payment of duty. Wines and spirits may be blended, fortified, and otherwise dealt with in the warehouse under defined conditions. The Customs or Inland Revenue authorities are not liable for any damage caused to the goods by accident while in the warehouse. The system was part of Sir R. Walpole's abortive Excise scheme in 1733, but was only adopted for the British Customs in 1802, and for the Excise in 1823. The practice of the two services was partly assimilated in 1882.

Bondi, CLEMENT (1742–1821), an Italian poet, who became a Jesuit shortly before the dissolution of the Order, and afterwards librarian to the Archduke Frederic at Brunn, and in 1815 professor of literature and of history to the Empress at Vienna. He has been called the Delille of Italy, and like the French poet, he made verse translations of Virgil, and wrote a poem on *Conversation*, and he sings the praises of a country life. He is pure and elegant in style, but of no great inspiration or force. Among his works are: *Poemetti e varie rime; Giornata Villereccia: Poesie; Cantate: la Felicita; Sentences, Proverbs, Epigrams, and Apologues.*

Bondu, a kingdom of Africa, in Eastern Senegambia, between lat. 14° to 15° N., long. 13° to 14° W. Inhabited chiefly by Foulahs. The capital, which in Park's time was Fatteconda, is now Boulibane, on the Falame. The country is on the left bank of the upper Senegal, and its chief valleys are well watered and fertile. The land generally is mountainous and picturesque, but not very productive. Cotton, fruits, indigo, maize, rice, and resin are the main productions; and the people, who are of gentle manners, breed a few horses, cows, and goats. There is a considerable transport trade in slaves, salt, iron, vegetable butter, and gold dust.

Bone. Bones form the supporting basis of the body in most vertebrate animals. The bones of limbs serve as levers, which are acted upon by the various muscles, while the osseous framework of the skull and thorax protects the important structures inside those cavities from injury. Bone combines in a remarkably perfect manner the properties of hardness, lightness, and elasticity.

Structure of Bone. Bones are covered externally with a vascular fibrous membrane called the periosteum, the blood-vessels of which minister to the nutrition of the bone. Internally lies the medullary cavity of the bone, containing the marrow. The bone substance itself is either dense and "compact," as it is called, or it is "cancellous," *i.e.* made up of more loose-textured spongy material. In the long bones, compact bone is the rule; while in flat bones, cancellous bone is found, with an outer protecting shell of compact substance. A transverse section of a long bone shows, on miscroscopic examination, a large number of rounded spaces, about which concentric lamellæ of osseous substance are disposed. Each central space corresponds to a canal, running in the direction of the long axis of the bone, and containing a blood-vessel concerned with the nutrition of the surrounding lamellæ. These canals are called Haversian canals, and, with the concentrically arranged layers of bone, constitute the Haversian systems. Lying between the lamellæ are found cells termed bone corpuscles, the processes of which penetrate some little way into the surrounding bone. The spaces in which the corpuscles lie are called lacunæ, and the channels branching out of them into which the processes penetrate are termed canaliculi. The lacunæ communicate by means of the canaliculi with the central Haversian canal, and thus nutrient material obtains access to all parts of even the densest bone. In spongy bone there are no typical Haversian systems; there are delicate trabeculæ or bars of osseous material enclosing comparatively large spaces filled with marrow. Thus the blood supply of the bone comes in part directly from the periosteum, again from the bone marrow, and, in the case of long bones, from the vessels running in the Haversian canal.

Chemical Composition. Bone contains about one-third part by weight of animal or organic matter, and two-thirds of earthy or mineral substance. These two constituents are blended with one another in the most intimate matter. By immersing a bone in dilute acid all the mineral part can be gradually dissolved out and removed, and yet the remaining pliable animal matter perfectly retains the original shape of the bone. Again, by exposure to heat the animal portion can be completely burnt off, leaving a firm calcareous mass, the mineral part, which again exactly retains the form of the bone from which it is obtained. The animal matter is converted, by boiling, into gelatine, hence the use of bones in cookery in the making of jellies and soups. The mineral salts present in bone are the phosphate, carbonate, and fluoride of calcium, with a little phosphate of magnesium. Calcium phosphate makes up the main bulk of the earthy matter present, and forms more than half the total weight of a bone. An adequate supply of this salt to young animals, in which the osseous system is undergoing rapid development, is therefore of paramount importance. Such supply is perfectly afforded by the natural diet of new-born mammals—milk—for calcium phosphate is the chief salt in milk, just as it is in the bone into which the milk is converted. Rickets (q.v.), unhappily a very common disease in young children, affects in a marked degree the growing bones, which bend and give rise to numberless deformities; and in the case of rickety children there is almost always to be elicited a history of a departure from the natural infant dietary, the child being fed upon farinaceous and other foods containing much less calcium phosphate than milk does. There are two varieties of marrow. Yellow marrow, found in long bones, consists mainly of fatty tissue. The red marrow of cancellous tissue contains some fat, but, in addition, many "marrow cells," resembling lymph cells in structure. The red marrow is largely concerned, too, in the manufacture of red blood corpuscles.

Development of Bone. The long bones are developed from rods of cartilage. At certain

TRANSVERSE SECTION OF BONE.
(*Magnified 60 diameters.*)

points in the cartilage, called centres of ossification, there ensues increased vascularity with deposit of lime salts from the blood, a process termed calcification. By means of this process the growing ends of the bone continue to add to its length, until the adult condition is attained. All the calcified cartilage becomes, however, replaced by spongy bone, and ultimately this, too, is absorbed, and the true bone, formed beneath the periosteum, is laid down. The bone thus increases in thickness, and, the central portions entirely disappearing, it results that the marrow cavity of an adult bone would readily enclose the rod of cartilage from which its development originally proceeded. This development of bone in cartilage does not obtain in the case of flat bones, which are developed in membrane, In the membrane bones of the skull, for example, there is no cartilage from first to last, the osseous material is formed from the periosteum.

Diseases of Bone. Ostitis is inflammation of bone; *periostitis*, inflammation of the enveloping periosteum, and in *osteomyelitis* the diseased

process mainly affects the medullary cavity and immediately surrounding parts. As the result of periostitis, thickenings, called nodes, may be left on the surface of bones. *Ostitis deformans* is a singular and rare disease affecting mainly the long bones. As the result of inflammation a large piece of bone may perish (*necrosis*), or a smaller portion of dead bone may be separated (*sequestrum*). *Caries* is a gradual eating-away or ulceration of osseous substance; *strumous caries* is very apt to affect the vertebræ, leading to angular curvature. *Syphilis* and *cancer* may both affect bone. Besides the important degeneration processes in bone associated with rickets, another, fortunately much rarer affection, known as *mollities ossium* or *osteomalacia*, may be referred to. *Exostosis* is a dense osseous outgrowth sometimes found growing from a bone. Very valuable assistance in the detection of injuries to bones has been afforded by the discovery of the Röntgen or X rays (q.v.). [*See also* FRACTURE.]

Bone Ash consists chiefly of a mixture of calcic-phosphate ($Ca_3P_2O_8$) with some calcic carbonate ($CaCO_3$), obtained by calcining bones in open furnaces. It is employed in manufacture of cupels and artificial manures.

Bone Black, a mixture of charcoal (10 per cent.) with various inorganic salts, chiefly calcic phosphate, known also as "animal charcoal," and obtained by heating bones. The bones, preferably sheep or ox bones, are first boiled for some time to remove fatty matters, then dried and heated strongly in iron retorts. Gases pass off, some of which condense forming *bone oil* (q.v.); the uncondensed portion, after purification, may be employed for illuminating or heating purposes. The *bone black* is left in the retorts, is taken out, crushed and ground between stone or steel cylinders. It is largely used in the manufacture of blacking, in sugar refining, and as a pigment.

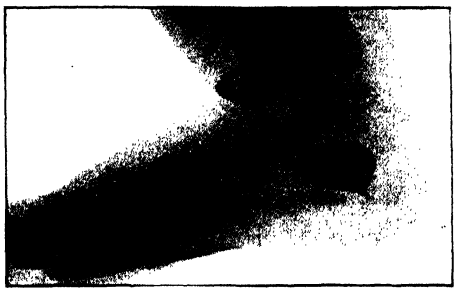
Bone-caves are caverns, occurring mostly in limestone, from which bones of animals, the more interesting of which are no longer living in the same area, have been obtained. The caverns are the result of the solvent action of water charged with carbon-dioxide from the air and from vegetable mould, acting along joints (q.v.) or other fissures in the limestone. Their roofs often fall in at some points, forming natural pitfalls into which numerous animals may have fallen. From a cavity 25 feet by 18, at Castleton, Derbyshire, 6,800 bones of bison, reindeer, bear, wolf, fox, and hare were obtained. In other cases bones have been washed into the cave with silt carried by a flood. Many caverns have, or had, mouths opening on the sloping sides of valleys, where the streams, which sometimes issue from them, run into some river. Here animals may find an entrance. Bone-caves are divided into *fissure-caverns*, into which bones have been washed; *dens*, into which carnivors, such as the lion, bear, and in England especially the hyæna, in Ireland, the wolf, and at the present day the fox, have dragged the carcases of their prey; and *shelter-sheds*, into which old or infirm animals retire to die. In Syria at the present day nomad hunters drive out the hyænas and temporarily occupy their dens, and so it seems to have been in prehistoric times in Britain. In some cases rude chipped flint implements (*palæolithic*) are found in the lowest deposits, and others more highly finished and polished (*neolithic*), with bone needles and fish-hooks, and even relics of the bronze and iron ages, in higher layers. The bones and other relics are either on the dry floor of the cave, or in *cave-earth*, a red clay residue from the dissolved limestone, or a fine silt washed in through fissures, or in *stalagmite* (q.v.), the carbonate of lime left by evaporation on the floor, often several feet thick, or in *bone-breccia*, mixed with fallen fragments of the roof and cemented by stalagmite. Human bones are but rarely met with among the oldest deposits, but his implements show man to have lived in Britain with *Machairodus*, the sabre-toothed tiger, the mammoth elephant, the great Irish deer, the grizzly bear, and the hyæna. Among the most important bone-caves in Britain are the systematically explored Kent's-Hole, Torquay, and those at Cae Gwyn, North Wales, the deposits in which are supposed to be partly Pre-glacial. In those of the Dordogne and elsewhere in the south of France, numerous reindeer bones are found with those of man, and incised representations on bone and ivory of the reindeer and the mammoth. There is evidence in South Devon and elsewhere of considerable changes in physical geography, such as the deepening of river-channels, since the caves were first inhabited.

Bone Manures, artificial manures obtained either by the simple grinding of bones to a flour-like powder, or by first treatment with sulphuric acid. Bone black after use for sugar refining is often so treated and employed as manure. Bone manures owe their value chiefly to the phosphate present.

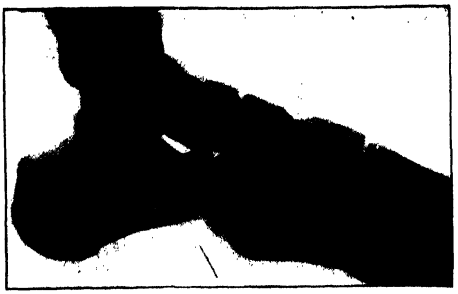
Bone Oil, obtained during the manufacture of "bone black" (q.v.), is a dark brown liquid with an offensive odour. By redistillation a large number of organic substances are obtained, chief amongst which being *pyrol* and *pyridine*, of which substances it is an important source. After distillation a black tarry liquid is left, known as Brunswick Black.

Boner, ULRICH, a German fabulist and Dominican monk, who lived at Berne in the 14th century. Not very much is known of his life; but he left behind him a collection of fables called *Der Edelstein* (*The Jewel*), the first edition of which was published in folio at Bamberg in 1461. Only two copies of this are known to exist, one of them being in the library at Wolfenbüttel. There is a good edition, with glossary (Berlin, 1816), and there is an edition of 1844.

Bonfire (lit. a *bone-fire*, for so the Northern form *bane-fire* is glossed in the *Catholicum Anglicum*, an English-Latin word-book, dated 1483), any large fire kindled on a high or open space, originally as an act of worship, and later as an act of commemoration or rejoicing, generally of a public



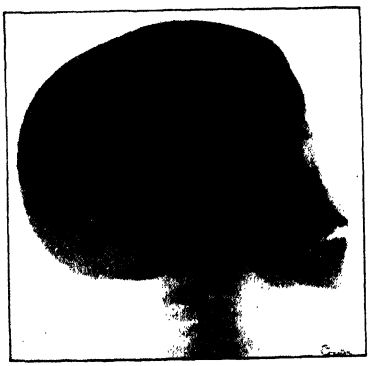
Foot of an Infant, *æt.* 6 days, showing partial formation of bone.



Foot of Adult, showing a needle embedded in the flesh.

Hand of Child, 3 years old, showing growth of bone.

Lady's Hand Normal.



Living Head.

Chest and Ribs.

N. E.- 6

BONE.

From X-Ray photographs supplied by Coxeter & Son, Grafton Street, W.C.)

character. The kindling of bonfires as a religious act is certainly pre-Christian, and there seems to have been some special significance in Jewish times in the burning of human bones (1 Kings xiii. 2; 2 Kings xxiii. 20; 2 Chron. xxxiv. 5; Amos ii. 1).

Bonheur, ROSA, French female painter, born at Bordeaux in 1822. She lost her mother when she was seven, and a reverse of fortune made it necessary for her father to separate from his children, and rely on his brush for his and their support. Rosa's extraordinary talent had already shown itself, and its increase made her father resolve to teach her himself. She is said to have studied in the Paris slaughter-houses, and, to avoid notice, to have adopted male costume for her visits. In 1840—her eighteenth year—she was for the first time able to exhibit, showing *The Two Rabbits*. In 1845 she received a third-class medal, and in 1848 a first class. But the French complain that the English carried off all her pictures. The best known of her works are probably the *Horse Fair*—now in America—and the *Hay Harvest in Auvergne*. Through the exertions of the Empress Eugénie, Rosa Bonheur received the Cross of the Legion of Honour. She died in 1899.

Boni, a native state in the island of Celebes, on the east coast; about 800 miles long and ranging from 40 to 80 miles in breadth. The Dutch have a nominal suzerainty over the state, which is inhabited by an enterprising race. The capital is Bayoa, and there is also a town Boni on a bay of the same name on the south coast of the island. The soil is fertile, and produces among other things cassia, rice, and sago.

Boniface, the name of nine Popes of varying historic importance. Boniface I. [St.] (418–422) was supported by the Emperor Honorius against his rival Eulalius. It was to this pope that St. Augustine dedicated his work against the Pelagians. Boniface II. (530–532); Boniface III. (607–608) obtained from the Emperor Phocas an acknowledgment of the title of universal bishop as the right of the pope. Boniface IV. (608–615) transformed the Pantheon into a church. Boniface V. (619–625) maintained the rights of sanctuary. Boniface VI. (896) only reigned a fortnight. Boniface VII. (984) is considered by some writers as an anti-pope. Boniface VIII. (1294–1303) was renowned for his struggle with Philippe le Bel over the question of supremacy. Dante has placed him in hell for simony. Boniface IX. elected at Rome (1389–1404) during the schism of Avignon. He was the first pope to wear the triple crown.

Boniface, ST., the great apostle of Germany (680-755) was born in Devonshire. His real name was Winfrid. Ordained priest at thirty, he determined to devote his life to converting the heathen of Germany, and to this end he began his mission in 716 in Friesland, going on to Saxony, Thuringia, Hesse, and Bavaria; and founding churches and monasteries—notably the celebrated abbey of Fulda—and bishoprics. Gregory III. appointed him archbishop, primate of Germany, and legate of the Holy See, and he it was who consecrated Pepin le Bref, on behalf of the pope Zacharias. He was massacred with fifty-three companions by the savages of Friesland. He has left letters and sermons.

Bonifacio, STRAITS OF, separating Corsica from Sardinia, and having at the narrowest part a width of from six to seven miles. The straits derive their name from the town of Bonifacio in Corsica. The passage is very dangerous during the west winds, and was the scene during the Crimean war (January 15, 1855) of a disastrous wreck. The *Sémillante*, with a crew of 350 and a body of 450 infantry on board, struck a rock and foundered immediately, not a man being saved. It is this wreck that Alphonse Daudet describes in one of his exquisite *Lettres de mon Moulin*.

Bonin, a volcanic group of islands, of 32 square miles in area, in the Pacific ocean, about 700 miles S.S.E. of Japan; lat. 26° to 27° N.; long. 155° to 159° E. They were discovered in 1639, and taken possession of for England in 1827, but in 1878 the Japanese government successfully claimed the sovereignty.

Bonington, RICHARD PARKES (1801–1828), an English painter born at the little village of Arnold near Nottingham. His father, who taught him to draw, came in 1816 with his family to France, and here Richard Parkes Bonington entered into the studio of Baron Gros in 1819. Caring little, however, for academic studies he soon quitted Gros to go and study the great Flemish landscape masters in the Louvre, and from them learnt that nature is the best master. He went into Normandy and brought back some fine water-colours, and at the Salon of 1824 he exhibited his water-colour, *View of Abbeville*—and four oil-colours, *View in Flanders*, *A Sandy Shore*, and two sea pieces. These works won for him a gold medal. After a trip to England he went in 1826 to Italy, and especially to Venice, where he painted what some consider his masterpieces—*View of the Ducal Palace* and *View of the Grand Canal*. At the height of his fame, when he was projecting a work on a large scale, he was seized by a brain fever, or, as some say, by sunstroke, and though he tried to work it down, his efforts were vain, and it killed him. Eugène Delacroix, in criticising his painting, cannot too much admire his wonderful grasp of effect and ease of execution, and M. Bürger considers him little, if at all, inferior as a landscape painter in delicacy of touch and harmony of colour to Gainsborough, to Constable, or to Turner.

Bonito, a popular name adopted from the Spanish for the following fish of the Mackerel family (Scombridæ): *Thynnus pelamys*, called also the Stripe-bellied Tunny, a tropical fish, 30 inches to 36 inches in length, of a steel-blue colour, with four dark lines from the pectoral fins to the tail. It occasionally strays to the British coasts. The name is also applied to some other tropical species. [TUNNY.] *Pelamys sarda*, the Mediterranean Bonito,

about 2 feet long, a valuable food-fish, is closely allied; it has the back and sides marked by dark oblique transverse bands, and is found on both sides of the Atlantic, and in the Mediterranean and Black Seas. *Auxis rochei*, the Plain Bonito, from the Mediterranean Sea, and the Atlantic and Indian Oceans, is of uniform blue colour, and of little value for food.

Bonivard, FRANÇOIS DE (1494–1571), historian of Geneva. Though born in Burgundy, he identified himself with the interests of his adopted country. He was prior of St. Victor, just at the gates of Geneva, and in the struggles that took place during the attempts of the townsfolk to resist the tyranny of Charles III., Duke of Saxony, he was taken prisoner, and confined in the castle of Chillon —in which connection Byron has immortalised his name by introducing an imaginary picture of his imprisonment for four years in the underground dungeons below the level of the waters of Lake Leman. When the Reformation gained the day at Geneva, he recovered his freedom but not his priory. However, the town gave him a pension, and he adopted Protestant principles, and was married four times. His reformed dress did not sit easily upon him, for he was summoned before the Consistory for lightness of conduct. His *Chronicles of Geneva* have been described as more remarkable for passion and brilliance of style than for truth, and he has been called the Montaigne or the Rabelais of Geneva. His treatise *De l'Ancienne et Moderne Police de Genève* is of historic interest as throwing light upon the establishment of Calvinism.

Bonn, a town of the Rhine province of Prussia, on the left bank of the Rhine, and some 15 or 20 miles S.E. of Cologne. It has a cathedral and a bishop, a university, an academy of naturalists, an observatory, a botanical garden, scientific collections, a museum of antiquities, and a library of 200,000 volumes. There are also manufactures of cotton, silks, soap, tobacco and vitriol, and some trade in grains, seeds, wines, and lead ore. The cathedral, restored about the middle of the 19th century, is a good specimen of late 13th century architecture, and is said to have been founded originally by the Empress Helena. On the cathedral square is a bronze statue of Beethoven, who was born at Bonn in 1770. There is also a statue of the antiquary, Winckelmann, and monuments of Niebuhr and Arndt. The university (founded in 1818) is in the ancient palace of the Electors of Cologne. The great hall has some remarkable frescoes emblematical of the four faculties, and the university is very rich in collections of different kinds, besides its library of over 200,000 volumes. A Roman altar of Victory preserved here is thought to be the "Ara Ubiorum" mentioned by Tacitus (*Annals*), and the town, called Bonna by the Romans, was one of the first strong forts erected on the Rhine by Drusus. It has suffered much in war at various times. A member of the Hanseatic league in the 13th century, its forts were dismantled in the 18th; but the town is regaining some of its ancient renown. It has been a stronghold of the Old Catholics.

Bonnat, LEON, a French painter, born at Bayonne, 1833. After studying in Spain he exhibited for the first time in the Salon of 1857. He then went to Italy, and confined himself chiefly to imitating the old masters. In this and in some kinds of religious paintings he met with success. His *Good Samaritan*, at the Salon of 1859, showed progress, and his *Adam and Eve finding Abel dead*, and a little Italian sketch of a girl, *Mariuccia*, gained him a gold medal. But it was not till 1864 that Th. Gautier was able to congratulate him on having attained originality and a style of his own, in his *Pilgrims at the Foot of St. Peter's Statue at Rome*. His painting of an Italian beggar boy, *Mezzo bajocco Eccellenza*, is admired, as also his *Italian Peasants before the Farnese Palace*.

Bonner, EDMUND (1500–1569), educated partly at Oxford, where his achievements gained him the patronage of Cardinal Wolsey, who confided to him some important negotiations. After Wolsey's fall he came into favour with the king, and even offended the pope by his zeal in Henry's behalf. He was made Bishop of London, and was forced by his position to advance the punishment and persecution of the reformers. In Edward VI.'s reign he lost his bishopric and was imprisoned. Freed by Queen Mary four years later, he was again imprisoned by Queen Elizabeth for refusing the oath of supremacy, and finally died in the Marshalsea. He left some writings; among others, *Letters to Lord Cromwell*.

Bonnet, a head covering. The term was formerly applied in France and Scotland to some forms of male as well as female head-dress. For men, the bonnet was superseded by the hat in England in the 16th century. The "bonnet rouge," or cap of liberty, an imitation of the cap worn by the Roman slave on his emancipation, became, after 1791, the emblem of Republicanism in France, and later in the Republics (Helvetic, Ligurian, etc.) formed in imitation of it. It was, however, confined to men, women using the cockade. In Scotland bonnets were worn till the end of the 18th century. The Lowland Scots bonnet was made of thick seamless woollen stuff covering the head and part of the neck; it was usually blue with a red tuft. The Highland bonnet was a large variety of the "Glengarry," now familiar as the undress head-covering of the British infantry. The Balmoral bonnet was an intermediate form. As to ladies' bonnets, Leghorn bonnets are made of a peculiar wheat-straw, grown in Tuscany for some 200 years. Split-straw bonnets have been made about Dunstable for over a century. Bonnets of other materials, *e.g.* silk or velvet, with artificial-flower or feather trimmings, are largely made, or at least designed, in Paris. No article of dress, probably, is subject to such variations in size or form.

Bonnet, CHARLES, naturalist and philosophical writer, was born at Geneva in 1720, never left his native country, and died in 1793. Nominally in

the legal profession, he early devoted himself to natural history. In 1740 he communicated to the Académie des Sciences his experiments on aphides (q.v.), showing their parthenogenetic reproduction. He then experimented on the reproduction of lost parts in worms, and the respiratory stigmata of insects, publishing in 1745 his *Traité d'Insectologie*, with an introduction on embryonic development, and the existence of a graduated scale of living beings. In 1754 he published his *Traité de l'usage des feuilles*, in which he showed, among other points, the heliotropism and hydrotropism of leaves when growing. Failing eyesight caused Bonnet to turn his attention to speculative science. In 1754 he published *Essai de Psychologie ;* in 1760, *Essai sur les facultés de l'Âme ;* in 1762, *Considérations sur les corps organisés ;* in 1764-5, *Contemplation de la Nature ;* and in 1769, *Palingénésie Philosophique*. He held that a multitude of germs were originally created, containing in themselves a power of advance towards, though not to, perfection ; that we have an immaterial mind, but that all knowledge originates in sensations, memory being conditioned by the increased flexibility produced in nerves by sensation ; and that happiness is the end of human existence.

Bonnet-piece, a gold coin of James V. of Scotland, now scarce and valuable, on which he is represented wearing a bonnet instead of a crown.

Bonneval, Claude Alexandre, Comte de (1675–1747), a celebrated French adventurer, born of one of the first families of Limousin. Forced from the navy by the consequences of a duel, he entered into the French guards, and bought his regiment in 1701. He fought in the Italian wars and displayed singular courage, but for insulting Madame de Maintenon he fell into disgrace, and was obliged to take refuge in Austria. Here he served under Prince Eugène against France, with the rank of Major-General (1710–1712), returned to France, married, deserted his wife, and went back to Austria. After distinguishing himself in two battles, he insulted Prince Eugène, and was deprived of his rank. He then took refuge in Turkey, and turned Mussulman. He became a general of artillery, a pacha, taking the name of Achmet, and tried hard to introduce European discipline and tactics into Turkey. He is said to have been contemplating a return to France when death put an end to his plans. Memoirs have been published in his name, but they are not genuine.

Bonneville, Nicholas de (1760–1828), a French writer and student of German literature. He made a translation of Shakespeare, and published some German tales under the title of *Nouveau Théâtre Allemand*. His moderation in politics seems to have been disagreeable to whatever party was in power, for the revolutionists imprisoned him, and he could not make himself pleasing to Napoleon. *L'Histoire de l'Europe Moderne*, and *L'Esprit des Religions*, are two of his works that have made some impression.

Bonny, a river of Guinea, forming a mouth of the Niger and falling into the Bight of Biafra, lat. 4° N., long. 7° to 8° E. It is accessible to vessels of considerable burden, and it affords good anchorage. The low swampy shores with their mud and mangroves and fevers will be familiar to readers of Michael Scott's *Cruise of the Midge*, as will also the slave-dealing which prevailed there till far into the 19th century. Bonny is also the name of an unwholesome town upon the east of the river. It has little other trade than the exportation of palm oil.

Bonomi. 1. Joseph (1739–1806), an architect born in Rome, settled in England, and was elected an A.R.A. 2. Joseph, son of the above, born also in Rome, 1796, made his studies in London, and gained renown as a draughtsman. He made a speciality of Egyptian subjects, and paid several visits to Egypt and the Holy Land, with a view to facilitate the illustration of the works of several Egyptologists which were entrusted to him. He wrote a book on Nineveh, and died curator of Soane's Museum in 1878.

Bonpland, Aimé (1773–1858), French botanist and traveller, studied medicine under Corvisart in Paris, and served as a surgeon in the French navy. He went with Humboldt in his five years' research expedition in the Amazon and Orinoco country, in Mexico, and Colombia. As the fruits of this expedition Bonpland brought back and classified 6,000 plants, till then for the most part unknown in Europe. After publishing some botanical works he tried to persuade Napoleon to retire to America. Not succeeding in this, he went himself (1816) to Buenos Ayres, taking with him various European plants. Elected professor of natural history, he soon threw up this employment in order to explore the centre of the continent, and projected an expedition up the Parana. In 1821 Dr. Francia, the dictator of Paraguay, arrested him as a spy, and kept him a prisoner for ten years at Santa Marta, where he interested himself in doctoring the poor of the neighbourhood. After being set free, he spent some years in the province of Corrientes, whose government showed its regard for him by giving him an estate. At Santa Anna, where he went in 1853, he cultivated the orange trees which he had introduced, and devoted himself to scientific research, and here he died.

Bonstetten, Charles Victor de (1745–1832), a Swiss publicist and judge, who was born at Bern. Soon after the age of fourteen he was sent to Geneva, where he imbibed principles hardly in keeping with the traditions of the noble family to which he belonged. His father recalled him, and finding that the dulness of Bern was unsettling his brain sent him to Leyden, from which place he went to England, and thence to Paris. After his father's death he went to Italy, and on his return he received different judicial appointments in his native land. But his birth and connection on the one hand, and the views with which he was credited on the other, prevented his getting on with either party, and at the beginning of the

political troubles he went to Copenhagen, and finally came back to Geneva, where he finished his life. He was not of any exceptional merit either as author or philosopher; but he was a good talker, and was the friend of many great men. His principal works are *Recherches sur la Nature et les Lois de l'Imagination*, *Étude de l'Homme*, *L'Education Nationale*, *L'Homme du Midi et l'Homme du Nord*, and *Pensées sur Divers Objets du Bien Public*.

Bonus (*Lat.* good), a term usually applied to the share of surplus profits added from time to time to the value of policies of life insurance. (This surplus is partly due to the fact that the death-rates on which the ordinary life insurance tables are calculated are too high considering modern improvements in sanitation and medicine.) Also an extraordinary distribution of extra profits, or of additional shares, sometimes made by railway or other companies among their shareholders: or a present made by some shopkeepers to customers who buy a certain quantity in a certain time.

Bony Fishes, a book-name for the Teleostei, the largest and most important sub-class of Fishes (q.v.). They appear first in the chalk, and, according to Dr. Günther, stand in the same relation to the *Palæichthyes* (q.v.) as placental mammals do to the marsupials. The chief characteristics of this sub-class are: A more or less complete bony skeleton, the centra of the vertebræ being always ossified, and some portion of the cartilage of the skull replaced by bone; the optic nerves cross; the gills are free and covered by an operculum (q.v.); the branchial artery has a non-contractile dilatation in front of the heart; there is no spiral valve attached to the intestines. The Teleostei are divided into six orders:—

1. *Acanthopterygii.*—Spinous rays on dorsals, and ventrals; lower pharyngeals separate; air-bladder without duct. (Examples: mackerel, mullet, perch, sea-bream.)
2. *Acanthopterygii Pharyngognathi.*—These differ from No. 1 in having the lower pharyngeals united. (Examples: gold-sinny, tautog, wrasse.)
3. *Anacanthini.*—Fins without spinous rays; ventrals, if present, on throat or breast, lower pharyngeals separate; air-bladder without duct. (Examples: cod, haddock, hake, ling, sole, turbot.)
4. *Physostomi.*—Fins without spinous rays; ventrals on belly; air-bladder with duct. (Examples: carp, pike, roach, salmon.)
5. *Lophobranchii.*—Gills composed of small rounded lobes; dermal skeleton of numerous pieces. (Examples: hippocampus, pipe-fish.)
6. *Plectognathi.*—A soft dorsal opposite the anal; ventrals obsolete or reduced to spines; skin armed with scutes or spines, or naked. (Examples: file-fish, globe-fish.)

Bony Pike (Lepidosteus), a genus of Ganoid Fishes constituting a family (Lepidosteidæ), dating back to Tertiary times in Europe and North America, and now confined to the United States, Mexico, and Cuba. The body is elongated and sub-cylindrical, and covered with lozenge-shaped scales arranged obliquely so as to overlap, and form a bony armour; skeleton bony; and the vertebræ —round in front and hollow behind—allow great mobility; tail heterocercal; paired fins unlobed. The snout is produced, and the upper jaw is the longer; teeth of unequal size in double rows, longer on the lower jaw. There are three species:—*L. viridis*, *L. platystomus*, and *L. osseus* (the commonest). The general colour is brownish or greenish-yellow, sometimes with black spots. These fish frequent shallow and reedy places, and to their form and voracity their popular name is due. They are called also gar-pike and garfish, but are not allied to the pike (q.v.) or true garfish (q.v.).

Bonze, the European name (a Japanese word) of the Buddhist priests of China and Japan.

Booby, the popular name for some species of Sula, a genus of diving-birds of the Pelican family, and especially *Sula piscator*, frequenting desolate islands and coasts in all tropical and sub-tropical regions, seldom wandering more than 20 leagues from land, to which it returns at nightfall. This uncomplimentary name is said to have been bestowed because these birds allow themselves to be killed or captured without attempting to escape, but Audubon denies this, and asserts that they grow wary by experience. The booby is about 30 inches long, allowing 5 inches for the straight conical bill, and 10 inches for the tail, which, as in the cormorants, is stiff, and serves as a point of support for the bird on land: the female is rather smaller than the male. The plumage is dusky-brown above, and whitish beneath; the young are spotted with white and brown. It is almost constantly on the wing, and swoops down on the fish that swim near the surface, rising almost immediately. The nest is a rude structure of dry sticks and seaweed, and never contains more than one egg. The flesh is dark and unsavoury, but is sometimes eaten by sailors.

Book (German *buch*; A.S. *bóc*: the term is by some connected with German *biegen*, to bend; by others, with more probability, with *buche*, beech, on the bark of which runes (q.v.) were inscribed). A certain number of pages of an ordinary modern book are printed at once, and, until the introduction of rolls of machine-made paper, each set was printed on a separate sheet. From the number of pages on a sheet (four, eight, etc.) the size of the book, quarto, octavo, etc., formerly derived its designation; but the changes in modern printing have rendered this inexact and often misleading. [BOOKBINDING.] Probably the earliest form of book was a roll of papyrus, written on both sides, and mounted on two sticks, one at each end, so that it could be unrolled as the reader required. The earliest extant example, the Papyrus Prisse, containing two short ethical treatises, can hardly be later than 4,000 B.C., and is known to be a copy. Parchment or vellum was afterwards introduced when papyrus was scarce for a time—it is mentioned indeed by Herodotus, in the fifth century B.C., and was used by the Phœnicians — and probably, as its use became more common, the form of book familiar to us was adopted from the arrangement of the sets of oblong wax tablets used by the Romans for writing memoranda, probably during the first century A.D. Seemingly, however, the papyrus roll was not finally obsolete till the seventh century A.D. The

title-page of a modern book, containing the title and place of publication, as well as (usually) the date and author's name, does not occur in printed books till after 1476. Instead there is (as in MSS.), a colophon, a sentence or short verse at the end, giving some particulars about the book and sometimes the author. In the sixteenth and seventeenth centuries title-pages were overloaded with detail, and until the 19th century books were commonly described as "printed for" a number of specified booksellers; and they were not always accurately dated. Moreover, books which were supposed likely to be stopped by the authorities as containing prohibited doctrines, or as obscene, have often had false title-pages (thus an edition of Spinoza's *Ethica* was issued as *Daniel Heinsius' Poems*), or at least the place of publication has been misstated. Books published at the end of a year now often bear the date of the next, otherwise the tendency is in favour of accurate dating. The subdivision of a book into volumes has reference usually to the convenience of handling, rather than to contents. (Volumes, however, are often subdivided into "books," which usually has the latter significance, though it is suggested by the division of Greek and Latin works, which had the former.) In Germany it is a common practice to subdivide volumes (so-called) of a technical or scientific character into "parts" or half-volumes, and to publish each part separately, the later parts sometimes before the earlier — to suit the author's convenience. This is partly due to the custom of issuing revised and enlarged editions of standard works.

An "edition" means the quantity of copies issued at one time—often 1,000—but it may be any number. "*Editions de luxe*," handsomely bound and finished, are often limited to a small number, each being sometimes signed by the author, and the type is then broken up to increase their rarity and value. In the second-hand book trade, "uncut" means that the margins have never been cut down by the bookbinder, "curious" is a euphemism for improper, while "foxed" means that the pages are spotted.

Bookbinding may be conveniently classified into (*a*) the Fine Art, (*b*) the Bible and Church Service, (*c*) the Cloth Case, (*d*) the Paper-covered Departments. Of these the first is the most ancient, and is the modern form of the art which the monks of old carried on in their cells before even printing was invented. It was carried in the 15th century to a high degree of perfection in Italy and France, and in the latter country the most elaborate work still is done. In Germany also great skill in "blind tooling" has been exhibited since the 17th century. It is the custom on the Continent to issue most books, even the finest, in paper covers, and the purchasers have them bound according to their individual taste; but in England books are supplied to the public permanently bound in cloth, so that the fine art department is chiefly patronised by connoisseurs and bibliophiles. The fine art binder (*a*) has, as a rule in Great Britain, to deal with a book which has been in use, and the paper and ink of which have long been dry and "set." The book, stripped of its boards, has to be reduced in bulk and made pliable by being beaten with a broad and slightly-rounded hammer. With the same object it is rolled in powerful machines and subjected to great pressure. It is then sewn, and sometimes silk thread is used. The back is hammered round. The string bands upon which the book is sewn and built up extend two or more inches on each side, and these ends are "drawn-in"—that is to say, passed through holes made in the millboards and then securely pasted down. Thus the boards are laced firmly to the book. The edges are then cut, gilded, marbled, or coloured, and the book is headbanded to strengthen the top and bottom of the back, which is stiffened with paper. Prepared leather, pared thin at the edge, is then pasted over the boards and back, and turned-over the edges or boards, providing a cover for the whole. To this stage the work is termed "forwarding." The book then passes into the hands of the "finisher," who treats the surface of the leather with thin paste and size in order to fill up the interstices, making a ground for the ornament. The decorative design is executed with brass tools and gouges in a very delicate manner. The finisher must have the feeling of an artist to produce the desired effects, which are either in "blind," *i.e.* plain, or in gold, and sometimes are varied by the inlay of differently coloured leathers. In "calf" binding the title panel is usually in another colour. Half-bound books have a strip of leather glued or pasted over the back of the book and turned in, and reaching about an inch and a half on the board on each side. Cloth or marbled paper is then pasted on, with the edges turned over the boards in the same way as leather. Triangular leather "corners" are added for ornament and strength. Leather binding is applied to Bibles and church services (*b*), but many of the hand processes have to be replaced by machines, the number dealt with being enormous. The machines and the methods, however, do not necessarily correspond with those which belong to cloth work. The printed matter, as with publishers' books in general, is received by the binder in sheets, with the pages so arranged that three folds will produce a section of sixteen pages, which is the most economical and usual form. On the first page of each sixteen, at the foot, is a letter, or a number, called the "signature." The book usually commences with B, the preface and table of contents, etc., being A. For work of good quality, hand-folding is imperative; no folding machine is sufficiently accurate. The folder, a woman, brings the numbers of the pages one over the other. This is called "sighting." She then folds the edge evenly with a folding-stick. The folded sheets are afterwards pressed to give solidity. Then they are laid in sequence upon a table, and from each pile, in turn, one sheet is "gathered," the collector thus getting together in her hands the printed matter for a complete book. After this gathering revision is required. A collator examines the books separately, making sure that each is complete, and they are again pressed. End-papers

are afterwards pasted on them. Girls who sit before adjustable frames, upon which are stretched three or more vertical cords, then sew the book, section by section, to these cords. The cords are subsequently cut, leaving projecting ends, which at a later stage are pasted to the back of the book. The books having been again pressed, their edges are cut by machines and afterwards they are decorated. The books are formed into book shape by "rounding" with a hammer, and they are then "backed" in a machine which nips the back, a roller passing over it and making a groove on each side. Into this groove, or "joint," the boards fit. These boards are cut to size, the leather case being made on the book itself, to secure an accurate "fit." The boards are slightly larger than the book inside, and the projecting edges are called "squares." The case—*i.e.* the two boards, the "hollow" or back, and their leather cover—is ornamented by means of blocking presses which expeditiously perform, in one or more operations, work which approximates to that accomplished by the fine art craftsman in minute detail. Upon the same lines in respect to folding, sewing, pressing, cutting, rounding, and backing, the cloth work (*c*) proceeds. Sewing is here done by machinery as well as by hand. After the book has been "formed," as already described, the back is stiffened with a strip of "lining cloth," which resembles canvas, and paper. These are glued to it, the cloth leaving a wide overlapping edge on each side. Meanwhile the case is also in course of making. The pair of millboards is covered with "cloth," which is a cotton fabric, loaded with starch, dyed or printed, and calendered. Occasionally it is used plain, but generally it is embossed or grained. Cloth work originally began, seventy years ago, with an intention to imitate leather, and it continued in this groove for many years. The cloth is glued over the boards, the edges being deftly turned in by the workman. The case is left plain or else treated in a more or less elaborate and artistic style. In the early stages of this modern development of the trade, blind blocking with gold lettering only was in vogue, but after coloured cloths with gold ornament had been successfully tried, black ink was added, and, step by step, various improvements have been made, so that at the present time the designer can call to his aid not only differently-tinted and patterned cloths and gold and silver leaf, but, in addition, inks of every colour. These necessitate the employment of registering engraved brass blocks, one for each colour or metal required. The requisite impression is imparted by blocking hand and power presses, which are heated. The gold leaf is applied to the design by "layers on." The case having been made to fit the book and the book the case, all that remains to be done is to put the book inside its case, and then to paste firmly to the boards not only the "end papers," but the overlapping margin of lining left for that purpose. These strips, attached as they are to the back and to the boards, act as a hinge. The completed books, still moist, are finally placed between wooden boards in hydraulic presses, and when quite dry they are ready for the publisher. In magazine parts, or books covered in paper (*d*), the sheets are stitched, sewn, or clamped together with wire stitches, and the paper cover is simply glued to the back.

Book Club. [HAKLUYT SOCIETY.]

Book-keeping is the art of keeping a series of accounts relating to commercial transactions arranged in a systematic manner. The most rudimentary form of such an arrangement is to put the receipts on one of the pages of the book as it lies open, and the payments on the opposite page, so that they may run on side by side. The receipt side is called the "debtor," and the payment the "creditor" side; and the account is said to be "debited" with what the person, to whose affairs it relates, receives, and "credited" with what he owes. Even in small businesses, however, it is usually found necessary to have a rough "waste-book," containing receipts and payments as they occur, and a "journal," in which they are more or less classified; and generally the classification is carried further by the entry of various items in other books. But, of course, the complicated accounts of a large business comprise many classes of receipts and payments. There will be receipts from sales to customers: capital may be advanced by a bank; in some cases loans may be repaid, or there will be payments for rent, for rates, for goods purchased, for law expenses, for wages, etc.; there may be interest from investments; and the payments may be made in very different ways—by cheques, by drawing bills, in cash, and so on. Much more elaborate classification is, therefore, requisite, and a system has been worked out—first invented, it would seem, in the commercial cities of Italy, in the 15th century—of checking the possible errors in such complicated accounts by so keeping them that the general account can be checked by the various classified accounts, and *vice versa*. This is called "book-keeping by double entry," and proceeds on the principle, that as every payment of money or transfer of goods is a transaction involving two parties, accounts shall be kept from the point of view of both, and each transaction shall be recorded in two accounts. And it is further simplified by personifying, as it were, the various sellers of goods to the firm, or the modes in which payment is made under single heads—thus "Goods purchased," "Cash," "Bank," "Bill," etc., and having a separate account for each. Each of these persons, real or imaginary, is treated as a creditor for his outgoings, and a debtor for his receipts. Thus if a merchant purchases iron for £1,000, "Iron" is debited with £1,000, and is expected to meet it when the metal is disposed of, while the general account is credited with £1,000; and, should the payment be made by a bill of exchange, "Bills" will be credited, and the general account debited with the sum paid for the bill. At any time then the state of the firm's affairs can be ascertained by balancing all these accounts, and the correctness of the result tested by comparing it with the result of balancing the general account. For further details *see* CASH BOOK, WASTE

OURNAL, LEDGER, PROFIT AND LOSS ACOUNT.

Book Plates, the labels often found inside ooks, bearing the owner's name and coat of arms r other device. Many are curious specimens of ngraving, and Albert Dürer, Hogarth, and Bewick ave been among their designers. Of late years fashion has grown up of collecting them; the atin inscriptions on them, *e.g. Ex Libris Gul. tone* (one of the books of William Stone) have uggested the French name of *ex-libris*.

Book-trade. From the earliest scratching upon beech chip to the latest *édition de luxe* is a far ry, and yet that is what an account of the book-rade would amount to if we take an historical or tratical view of it; while a topographical survey ould imply a history of the whole process of ook-making from its first inception as a germ in he author's mind, to its final appearance fully lothed upon the drawing-room table, with all its amifications, and all the vexed questions that omplicate it, including the agitating question of hether the author exists for the publisher, or the ublisher for the author—a question about as asily solved as the other important question of Which was first, the egg or the hen?

The question of book-producing divides itself nto two simple parts. The writing of the book, hich is the author's part of the matter, and would e the whole of it if the author did not desire to e read; and the bringing the book to the public, r the public to the book, which is often the most ifficult part of the process. It is to this part of he question, perhaps solely, to which a considera-ion of the book-trade ought entirely to confine tself. Shakespeare tells us that "that book in nany's eyes doth share the glory, that in gold lasps locks in the golden story"—and it is certain hat the success of a book—not merely as a paying peculation—does depend in a great measure upon ccessories of type, paper, binding, convenience of andling, and the like. In the days before print-ng, when the copies of a book had to be laboriously nade, slowly one by one, and when, as the wise nan of old said, of making of books there was no nd—books were a luxury of the great and rich, nd as much attention was paid to the setting of he jewel as to the jewel itself. Hence the beautiful xamples of type and binding, and of artistic ccompaniments that made the reputation of he great printing and publishing houses of the ow Countries. Who, that has seen them, has not een lost in admiration before the exquisite plates f the Plantin Museum, as they lie just as the rinter left them in his house three hundred years go. And it is this wonderful artistic finish that eads to the enthusiasm of the book-collector, an nthusiasm looked on by some as the very acme of nadness.

The publishing of a book advances it one stage eyond the author; but much still depends upon he wholesale dealer, and as much more upon the etailer, to ensure its success, always supposing he book to be worthy of success, whether from its ntrinsic value, or from its happening to hit a particular taste, or want, or from whatever cause. But all these various topics, as to what conditions should exist between author and publisher, between publisher and wholesale dealer, and between the last and the retail trade, are far too complicated and involved to be treated otherwise than separately. Of recent years a very marked feature of the book trade has been the selling of standard works (chiefly of reference) through the medium of a daily newspaper. The system, largely practised in America, has been extensively adopted in England, several of the leading newspapers taking it up. Payments are made by instalments.

There is one part of the book-trade, and an important one, yet to be mentioned. That is the secondhand trade. The secondhand book-stall plays a great part in real life, as well as in comedy and in romance, and embraces all kinds of business, from the 1d. box up to the work of attending notable sales in all parts of the globe, and buying rare copies for thousands of pounds. Many of our greatest booksellers have begun from the second-hand book-stall, and many great book-makers have testified their gratitude to the odd minutes and half hours of gratuitous reading afforded by the bookstall.

In the earlier days of literature the part of the publisher was in a great measure played by the noble or royal patron, who parted with his gold pieces, and took the risk attendant on all book-producing in return for the glory reflected upon himself by his connection with the book, but at all times there has been a considerable mixture of functions among the publishers, and booksellers, and book-writers; and one has only to read of the transactions and literary meetings of Johnson and his contemporaries in their booksellers' shops; or of the relations of Scott, Thackeray, George Eliot, Miss Brontë, and others, with their publishers; or of the many publishers and booksellers who have made themselves a name as writers, to see that, in spite of questions of conflicting claims and disputes, union of the three branches is as essential to a healthy strength as it was in the case of the bundle of sticks in the fable.

Boole, GEORGE (1815–1864), English mathematician and logician, born at Lincoln, spent his life in scholastic pursuits. He was appointed Professor of Mathematics in Queen's College, Cork, in 1849. Besides many writings on various subjects connected with mathematics, he composed two systematic treatises, one on *Differential Equations*, and a sequel to it, on *The Calculus of Finite Differences*, which have become standard works. His *Laws of Thought* show logical power, but the attempt to represent logical processes by the symbolic treatment of mathematics is hardly likely to find favour except with mathematicians. Boole was well-read and interested in literature generally, and his private character endeared him to his friends.

Boom (cognate with *beam*) is a long stout spar run out from some part of a sailing vessel to which the bottom of a sail is made fast in order to keep it extended. They have various names

according to the sails made fast to them—topsail-boom, jib-boom, spritsail-boom, etc. The term is also applied to the stout spars run out from the deck of a modern ship of war, to make boats fast to when in harbour, or to suspend nets from as a protection against torpedoes; to the barriers of floating timber lashed together, which formerly sometimes in war blocked the entrance to a harbour, as at the siege of Derry in 1689; and to the dam of logs sometimes made by American lumbermen to obtain sufficient water to float down timber.

Boom, an Americanism used both as a noun and a verb (active or neuter), to signify a rapid rise in prosperity or in value, or in the attention attracted by some subject. Thus a rapidly rising town in the western United States is said to be "booming." A movement to run General Grant for the Presidency of the United States for a third term of office was concisely called "the Grant Boom." The word is said to be used in Western America to describe the rapid rising of a river, or it may be meant to suggest the noise and rush accompanying the discharge of a cannon ball.

Boomerang, the throwing-stick used in war, or hunting, by the Australian aborigines. It is of eucalyptus wood about 2 ft. 6 in. long and 2 in. broad, one side being flat with a sharp edge, the other thick and convex. It is thrown straight forward, but with a peculiar back-twist of the hand, the flat side being kept downwards: it soon rises in the air, whirls round and round and flies backward over the head of the thrower, striking objects behind or beside him with great force. Surprising accuracy of aim with it is obtained by the natives. No two boomerangs, it is said, are quite alike in their range or behaviour, or even have the same curve. The upward motion is due to the fact that the instrument from its shape strikes the air obliquely, and is lifted by it. "It may be tested," Prof. Tylor says, "by cutting boomerangs out of a card and flipping them." It seems to be a native invention, though approaches to it are said to be found in ancient Assyria and other parts of the East. The Rev. J. G. Wood regarded it as developed out of a flattened club.

Boone, DANIEL (1735–1820), an American pioneer who has been the subject of many memoirs and of many romances. He, like the trapper to whom Fenimore Cooper introduces us, loved the wilderness and liked to avoid the haunts of men. North Carolina, to which he had emigrated early in life, was not wild enough for him, and he made for the Red River, a branch of the Kentucky. Here he was captured by Indians; but, escaping, he fell in with his brother who was on his trail, and they spent a winter in a cabin. After a time he again went to the Kentucky country, and built a stockade fort which was twice attacked by Indians in 1777. The next year he was again captured by Indians, but escaped to the fort, and with his men repelled another Indian attack.

When Kentucky was joined to the Union, Boone's title as squatter was not enough to secure him his land, and he retired into deeper wilderness. But in 1813 he was awarded a tract of land as an acknowledgment of his public services, and it was at Charette on the Missouri river that he died.

Boorde, or BORDE, ANDREW (1490–1549), a native of Cuckfield, who, brought up to the Church and being a Carthusian, obtained a dispensation and became a doctor. Andreas Perforatus, as he punningly called himself, travelled widely in his *Wanderjahr*, and on his return to England was sent on a confidential mission by Cromwell. We then find him again gadding about the earth, at one time in Glasgow or Antwerp, at another in Rhodes or Jerusalem, and presently in the Fleet prison, where he died. It does not appear which of his vagaries led him to the Fleet, but he seems to have led a gay life. His *Handbook of Europe* and his *Itinerary of England* survive, and his *Introduction of Knowledge* contains the earliest known specimen of Romany.

Boos, MARTIN (1762–1825). a Catholic priest of Bavaria who began a kind of Pietist religious movement. He had a good deal of influence among his fellow-religionists, including many priests; but he was relentlessly persecuted by the majority, though he appears to have been in essentials a staunch Catholic. In 1817 he was appointed professor of divinity at Düsseldorf, and in 1819 removed to Sayn near Neuwied.

Boot, an instrument consisting of four long strips either of iron or of wood, fastened together, with space between, into a sort of case for the leg. Into the space wedges were inserted, and struck by the executioner with a hammer, so as to crush the leg. It was used in England in the 16th and part of the 17th century. In Scotland it was a familiar instrument in the persecution of the Covenanters by James II., but was finally made illegal on the union with England. It was used to extort confessions or other evidence.

Boötes, son of DEMETER and IASION, inventor of the plough and cultivator of the soil. He and his plough and his oxen were all taken up into the skies together, and they now form a constellation of which Arcturus is the brightest star.

Booth (from a Norse word = to dwell), a structure, usually temporary and often of osiers, sometimes of timber, used at markets or fairs as a shop. Mediæval booths were sometimes a sort of covered stall, with an open window, whose shutter was so divided midway that the top projected outwards and protected the goods arranged on the lower half, as on a counter.

Booth, BARTON (1681-1733), an English actor, son of a Lancashire squire. From Westminster he was to have gone to Cambridge, but took to the boards instead. On Betterton's refusal to employ him, he played for two seasons at Dublin. In 1700 Betterton gave him an opportunity, and he soon became a public favourite. He played the Ghost in *Hamlet* (1708), and his Cato in 1713 brought him both gain and glory. Henry VIII., Othello, Brutus,

Hotspur, and Lothario were favourite characters of his.

Booth, EDWIN THOMAS, son of JUNIUS BRUTUS BOOTH, born in America 1833, a successful American actor who has also visited England, Australia and Germany.

Booth, JOHN WILKES (1839–1865), son of JUNIUS BRUTUS BOOTH, was unsuccessful as an actor, and in 1865 assassinated President Lincoln, and was himself shot soon afterwards during an attempt at his capture.

Booth, JUNIUS BRUTUS (1796–1852), English tragedian, son of a London lawyer, famous as Richard III. at Covent Garden. He emigrated to America.

Booth, WILLIAM, founder and so-called General (*i.e.* "General Superintendent") of the Salvation Army (q.v.). Born in 1829 at Nottingham, he was a minister of the Methodist New Connexion, but is now chiefly known as the originator of the Army, which was first established on a religious basis, but now includes a great social scheme. Mr. Booth gave his own views upon the subject in the *Contemporary Review* (Aug., 1882). His organisation resembles an army in this—perfect obedience to the commander is required. The social scheme is still being developed; upwards of £100,000 was collected for it at the end of 1890, after the publication of *In Darkest England*. MRS. BOOTH, his wife, the "Mother of the Army," influenced to a large extent her husband's work, and her death in 1890 was felt as a great loss to all the members of the organisation. [SALVATION ARMY.]

Boothia, a peninsula of British North America, lat. 69° to 72° N.; long. 92° to 97° W. It was discovered by Captain Ross (1830), and was called Boothia Felix after the fitter-out of the expedition, Sir Felix Booth. The north magnetic pole is situate in Boothia. It forms the west side of the Gulf of Boothia, from which the Prince Regent's inlet leads into Baffin's Bay. Lakes and inlets almost separate Boothia from the American shore, and it is separated from North Somerset Island by Bellot Strait.

Booton, or BOUTON, an island—1,700 miles in area—of the Malay Archipelago, separated from Celebes and from the Isle of Muna by a narrow strait, and lying to the S.E. of Celebes. The Malay inhabitants are under the suzerainty of the Dutch, and the Sultan who lives at Bolio is controlled by a Resident. The island is well wooded, and produces fine timber. Maize, rice, and sago are cultivated.

Bopp, FRANZ, Sanscrit scholar and philologist, was born in 1791 at Mainz, on the Rhine. He was educated at Aschaffenburg, Bavaria, where his attention was drawn to the oriental languages by the lectures of Carl J. Windischmann. Removing to Paris, he there produced in 1816 his *System of Conjugation in Sanskrit*, showing the common origin of the Indo-European languages in their grammatical forms. A pension from the King of Bavaria enabled him to come to London, where he made the acquaintance, amongst others, of Colebrooke, and Wilhelm von Humboldt, and where he wrote *Analytical Comparison of the Sanskrit, Greek, Latin, and Teutonic Languages*. Returning in 1821 to Germany, he was appointed professor of Sanscrit and comparative grammar at Berlin, an appointment which he held till his death in 1867. His chief work, published in 1833-52, was *Comparative Grammar of Sanskrit, Zend, Greek, Latin, Lithuanian, Old Sclav, Gothic, and German*. He also wrote numerous treatises on ancient European and Asiatic dialects.

Bopyridæ, a family of ISOPODA, parasitic in the branchial cavity of certain Crustacea, *e.g. Bopyrus squillarum* in that of the Prawn. The usual degeneration has followed the parasitism, and the body is discoid, and has lost its segmentation and eyes.

Bora (Slavonic *bura*, storm), a strong, dry N.E. wind common in the N. of the Adriatic in winter, sometimes lasting several days.

Bora, KATHARINA, wife of Luther, was born in 1499 in Meissen. Entering a Cistercian convent, she "with eight other nuns" becoming dissatisfied, applied to Luther for assistance, and through him they were liberated in 1523. Two years later she married Luther, and after his death kept boarders for her support. She bore him three sons and three daughters, and was to him, in his own words, "a pious, faithful wife." She died in 1552 at Torgau.

Boracic Acid, or BORIC ACID, the acid derived from boric oxide (B_2O_3) by combination with the elements of water. It may be prepared from borax by the action of a strong acid. It occurs in the lagoons formed by the condensation of the vaporous springs or "soffioni" in the Maremma of Tuscany. From this source it is obtained to a very large extent by evaporating the liquid until the boracic acid crystallises out. Either in the form of lotion or ointment it constitutes a useful antiseptic application. Its main use is in cases of conjunctivitis and purulent ophthalmia, a solution containing 1 part of boracic acid in 20 of water being employed. A capital ointment is one made up of 3 parts of the powdered acid, 5 of paraffin, and 10 of vaseline.

Boracite, borate and chloride of magnesium ($6M_gO.8BO_3 + M_gCl_2$), in which the chloride amounts to 11 per cent., is a mineral which occurs associated with gypsum and rock-salt at Stassfurt in Saxony, at Kiel in Holstein, and elsewhere. It is slightly soluble in hot water, slowly so in acid, and fuses with difficulty into a yellowish bead which becomes white, opaque and crystalline on cooling, while the flame is coloured green. Its hardness is 7, and its specific gravity nearly 3. It occurs in white, translucent crystals of the cubic system, commonly cubes combined with the rhombic dodecahedron and the tetrahedron, and is chiefly interesting as being pyro-electric. The angles replaced by tetrahedral planes are the antilogous poles, exhibiting resinous or negative electricity when the mineral is being heated, vitreous or positive

electricity when it is cooling, while the opposite unmodified angles exhibit opposite characters.

Borage (*Borrago officinalis*), a European herbaceous plant which gives its name to the natural order *Borragineæ*. It is covered with rough, bristly hairs, as are most plants of the order, whence they have been called *Asperifoliæ*. Its leaves are scattered and its flowers polysymmetric, pentamerous, three-quarters of an inch across, and bright blue. Sprigs of fresh borage are commonly added to claret-cup; but cucumber is often substituted for it.

Borax, hydrous biborate of sodium ($Na_2B_4O_7$), occurs in nature and most commonly in commerce in oblique prismatic crystals, having ten molecules of water of crystallisation; but is also manufactured with only five molecules, and is then known as octahedral or jewellers' borax. Native borax is white or greenish, sub-transparent, resinous, soft, soluble and of a sweetish astringent taste. Before the blowpipe borax parts with its water with intumescence, melting into a clear, colourless glass which will readily dissolve many metallic oxides and exhibit characteristic colours. A bead of fused borax in a loop of platinum wire is therefore largely used in the blowpipe analysis of minerals. Borax used to be chiefly obtained from the evaporation of the waters of lakes in Thibet under the name of *tincal*. It is now obtained from Borax Lake, California, the bed of which consists of pure borax crystals, whilst its waters contain 535 grains of borax per gallon. Borax is also prepared by treating boracic acid (q.v.) with carbonate of soda. Octahedral borax is precipitated at temperatures between 79° and 56° C. Borax is largely used as a flux, in soldering, in glass-making, in making fusible glazes and enamels for pottery and artificial gems, and to economise soap in washing, though it has a corrosive effect upon fabrics. The two pharmacopœial preparations of it are the *Glycerinum Boracis* (1 oz. of borax in 4 fluid ounces of glycerine) and the *Mel Boracis* (56 gr. of borax in 1 oz. of honey). These preparations are much used in *stomatitis* or thrush. A lotion of borax is also employed to allay irritation in some forms of skin disease.

Borda, JEAN CHARLES, mathematician and physicist, was born in 1733 at Dax, in the French department of Landes. He served in the army and navy, and introduced new instruments for navigation purposes. He was also a useful member of the commission that framed the new system of weights and measures in France. He died in 1799.

Bordeaux (*Burdigala* of the Romans), one of the finest commercial cities of France, is the capital of the department of Gironde and is situated on the left bank of the Garonne in an extensive plain, comprising the district of Médoc, celebrated for its red wines. The river, which is crossed by a magnificent stone bridge of seventeen arches, is lined with quays, and at the northern end of the town is a dock covering an area of 25 acres. Among the ecclesiastical buildings the principal are St. André, St. Michel, St. Croix, St. Paul, and the church of the Collège Royal, where is Montaigne's tomb, whose statue with Montesquieu's adorns the principal square, Place de Quinconces. Bordeaux is the seat of an archbishopric, and its intellectual activity is shown by such institutions as its Academy of Science and Literature, theological, medical, art, and navigation schools, picture gallery, museum, and public library: and its theatre, the Grand, is one of the finest in France. Its chief manufactures are brandy, sugar, liqueurs, vinegar, calico printing, woollens, earthenware, etc. In 1152 Bordeaux passed under English rule, through the marriage of Eleanor of Guienne to Henry of Normandy, afterwards Henry II., being returned to France three centuries later. In 1871, during the Franco-German war, the first sittings of the National Assembly were held at Bordeaux in the Grand Theatre. In Bordeaux were born Ausonius the poet, Richard II., and Rosa Bonheur. Pop. (1901), 257,471.

Borders, THE, is the territory lying on both sides of the frontier line between England and Scotland. The counties bordering this frontier line, which runs for a distance of 110 miles from the Solway Firth to a point a little to the N. of the Tweed, are Cumberland and Northumberland on the S., and Dumfries, Roxburgh, and Berwick on the N. These districts are celebrated for the struggles between different clans and families either for plunder or supremacy, and are immortalised by Sir Walter Scott and by many a ballad and legend. The different events of importance connected with them will be found under their special names.

Border Warrant. A process issued by a judge-ordinary on either side of the border between England and Scotland for arresting the person or goods of a person living on the opposite side until he find security.

Bordighera, a town of N.W. Italy, in the Riviera, and on an eminence overlooking the Mediterranean, is a favourite winter residence for invalids. It has an English church.

Bordone, PARIS, Italian painter, was born in 1500 at Treviso. A pupil of Titian and Giorgione, he was in 1538 invited to France by Francis I., whose portrait with that of the Duke of Guise, the Cardinal of Lorraine, and other personages, he painted. His most celebrated picture is the *Gondolier presenting the Ring of St. Mark to the Doge*. In the National Gallery he is represented by *Daphnis and Chloe* and *A Portrait of a Genoese Lady*. He died in 1570 at Venice.

Bore, TIDAL, the heaping up of the tidal waters in a narrowing channel, generally the estuary of a river. In the Trent, where it reaches Nottingham, it is called the *ægir*, from a Scandinavian river-god. In the Severn it is a wave 9 feet high; in the Seine, where it is called *mascaret*, 10 feet, with a velocity of 13 miles an hour; in the Amazon, where it is called *pororoca*, 12 or 13 feet; in the Hooghly, 20 to 25 feet; and in the Tsien-tang, 30 feet, with a velocity of 25 miles per hour. Notable bores also occur in the Elbe, Weser, Dordogne, Garonne, and Orinoco.

Boreas, the name for the north wind as personified in Greek. He is represented in mythology as son of Astræus and Eos, and brother of Notus, the south, Zephyrus, the west, and Eurus, the east winds.

Borelli, GIOVANNI ALFONSO, mathematician, was born in 1608 at Naples. Educated at Florence, he taught mathematics at Pisa and medicine at Florence. He was the founder of the iatro-mathematical sect, or those who sought to apply mathematics to medicine as it is applied in physical sciences. Among his writings, the chief is *De Motu Animalium*. He died at Rome in 1679.

Borgerhout, a Belgian township adjacent to Antwerp, has bleach-fields, dye-works, tapestry factories, corn mills, etc.

Borghese, CAMILLO, in 1605 became pope and assumed the name of Paul V. He conferred upon his relatives wealth and honours, whereby they became among the most powerful of the Roman nobility.

Borghese, CAMILLO FILIPPO LUDOVICO, Prince Borghese, was born in 1775, at Rome. In 1803 he married Pauline, sister of Napoleon, and widow of General Leclerc. In 1806 he was created Duke of Guastalla, and under the French empire was governor-general of the Genoese and Piedmontese provinces. On the overthrow of Napoleon he retired to Florence, where he died in 1832. He had previously separated from his wife. The Borghese Palace is one of the finest buildings in Rome, and has a rich collection of paintings. The Villa Borghese has also some valuable art treasures.

Borgia, CÆSAR, born 1476, was the fourth son of Pope Alexander VI. At the age of seventeen he was raised to the rank of cardinal, which he afterwards relinquished, and was made Duke of Valentinois by Louis XII., with whom his father had entered into an alliance against Naples. In 1499 he married the Princess Charlotte d'Albret, sister of the King of Navarre. At the head of a body of mercenaries he then engaged, on behalf of the Holy See, in a series of petty wars, made himself master of Romagna, Perugia, Siena, Piombino, Urbino, and even threatened Florence, when his father died in 1503, and he himself fell ill. This was his enemies' opportunity, and he was arrested and carried to Spain, whence in 1506 he contrived to escape, and took refuge at the Court of Navarre. He afterwards served in the King of Navarre's army, and was killed in 1507 at the castle of Viana. Every species of crime has been ascribed to him, but whether truly or not it is difficult to say. Among his subjects he enjoyed the reputation of being just and upright, while he encouraged art and literature. It was Cæsar Borgia that Machiavelli held in view when writing his *Principe*.

Borgia, LUCRETIA, sister of Cæsar, was born in 1480, at Rome. In 1493 she married Giovanni Sforza, Lord of Pesaro, but in four years her father, Pope Alexander VI., annulled this marriage and gave her to a nephew of the King of Naples, Alphonso, Duke of Bisceglia, who in two years was murdered by the hired assassins of Cæsar Borgia. She was next given to Alphonso d'Este, son of the Duke of Ferrara. Like her brother, Cæsar, she has been accused of every kind of enormity—incest, poisoning, etc.—but modern researches make these imputations doubtful. She was much respected by her subjects, and patronised art and letters. She died in 1523.

Borgognone, AMBROGIO, painter, flourished 1490–1535, was born at Fossano, in Piedmont. He is also called sometimes Ambrogio Stefani de Fossano. Not much is known respecting his career, his most certain production being the *Coronation of the Virgin*, at Milan. In the National Gallery he is represented by *The Marriage of St. Catherine of Alexandria*.

Borgu, an African district intersected by the Niger. At one of the leading towns in this district, Boussa, Mungo Park lost his life in 1805.

Boring, a process of cutting holes in wood, metal, rock, or other material, by means of special tools designed for the purpose. For small holes in soft material the tool merely forces its way into the substance, but generally the borer is a rotating piece with a cutting edge. Thus for hard wood we have the *gimlet*, a cylindrical screw tapering to a point at one end, and having its threads cut in such a way as to peel off little shavings as the tool penetrates the material. Of this type of cutter there are several varieties. The *brace and bit* dispenses with the cylindrical screw, consisting only of the cutting edge at the end. It may be employed for cutting very large holes in wood. Similar to the brace and bit is the ordinary boring machine used for iron and other heavy metal work. Requiring more power, the framework of the machine must be substantial and must have firm foundations. It is usually driven by steam. The drill is modified at its cutting edge to suit the hard material it has to cut; the metal comes away in small, thin chips. The speed of rotation must not exceed a certain definite limit, fixed for each type of metal, and much slower than that for wood. If this is exceeded the metal is torn away irregularly, and the tool is in danger of losing its temper and breaking. The work is fixed to a table that admits of adjustment in various positions relative to the tool, the feeding of which may be done mechanically or by hand. The borer does not always cut out the entire hole. Sometimes the hole is already cast or wrought, and only requires uniform cutting to the requisite dimensions, as in the case of steam-engine cylinders. For this work special cutters are arranged on to a cylindrical bar, which may be fixed while the steam cylinder or other piece of work may be made to rotate. A solid core may be cut out entire by aid of a *trepanning bar*—a hollow cylinder with cutters round the front edge. [CANNON.] For rock-boring *diamond drills* are most generally used. The cutting edges are supplied by black diamonds, or carbonados, fixed round the front edge of a hollow steel cylinder, as are the cutters in the trepanning bar. Lengths of iron tubing are screwed on to this as the crown is made to penetrate deeper and deeper into the soil. The nature of the cores

of earth contained in the hollow rods shows exactly the disposition of the strata penetrated. The detritus is washed away by a current of water. *Boring-rods* act on the principle of augers, but are not so efficient as diamond drills. Nor are *rope-borers* so efficient, long used by the Chinese, and effective when the rocks are soft. In this case the cutter is attached to a rope, and descends by force of gravity, thus forcing its way through the earth. The detritus is lifted up by a scoop.

Boring Beetles. [XYLOPHAGA, TOMICUS, SCOLYTUS, etc.]

Borisov, a town in the Russian government of Minsk, is on the Beresina, and near the scene of Napoleon's disastrous passage of that river in 1812.

Borlase, WILLIAM, antiquary and naturalist, was born in 1695, in Cornwall. After studying at Oxford he became rector of Ludgvan, and subsequently vicar of St. Just, his native parish. In 1750 he was admitted to the Royal Society. His chief works are *Observations on the Antiquities of Cornwall*, 1754, and *Natural History of Cornwall*, 1758. He died in 1772, having given his collection to the Ashmolean Museum.

Born, BERTRAND DE, was born about 1145, at Perigord. He was a troubadour, and many of his songs are still extant. Richard Cœur de Lion is said to have aided his brother against him on account of his satires. Through his verses, too, which heightened the quarrel between Henry II. and his sons, he is placed by Dante in the *Inferno*. He died about 1209.

Börne, LUDWIG, political writer, was born in 1786, at Frankfort. After studying medicine at Berlin (where he met the famous Henrietta Herz), and law and political economy at Heidelberg and Giessen, he received an appointment in the office of police of his native town. Thereafter he applied himself to literature, finally settling in Paris in 1832, where he died in 1837. He was disappointed with the results of the French Revolution of 1830, having expected to find a new society according to his theories. He was an enthusiast and a radical, and between him and Heine there sprang up a bitter antipathy. His works comprise twelve volumes, and embrace satire, criticism, and wit; his strong point was sarcasm.

Borneo, the third largest island on the globe, is situated in the Malay Archipelago, being bounded N. and W. by the China Sea and Gulf of Siam, S. by the Sea of Java, and E. by the Celebes Sea. It is divided into two almost equal portions by the equator, and covers an area of 283,000 square miles. The coast line is little broken by bays and inlets, and the interior is only partially explored. The centre appears to be a plateau from which spread out various mountain chains, the chief running from S.W. to N.E. along the longest axis of the island. The island is plentifully supplied with rivers, some of which, though navigable, are yet shut off from the sea by the bars at their mouths. There are also a few lakes, the largest being Kinabalu. The climate is humid, and, notwithstanding the tropical position of the island, is in many places temperate. The vegetation is rich and varied, and its forests yield teak, dye-woods, ebony, guttapercha, gums, resins, etc. Its mineral products embrace gold, antimony, diamonds, quicksilver, zinc, coal, copper, marble, etc.—for the most part very abundantly. Among its animals are the elephant, the panther, the rhinoceros, the bear, deer, monkeys, crocodiles, and a great variety of smaller animals. The inhabitants are chiefly Dyaks, the aborigines, Malays, Chinese, and Buginese. The western, south-eastern, and part of the eastern coasts are Dutch possessions, and are ruled, for the most part, by native chiefs under the Dutch. Of the other political divisions of the island, the principal is the Malay kingdom, Borneo proper or Bruni, whose chief town Brunei is on the river of that name, and which is under the supremacy of the Sultan of Borneo, but, with Sarawak and British North Borneo, is under a British protectorate. On the west coast is the principality of Sarawak, made independent of the Sultan by Sir James Brooke, the noted rajah, and practically under English administration; while the island of Labuan off the N.W. coast is an English colony. In 1881 the British Government granted a charter to an English commercial company, which thereby exercises sovereign rights over the north of the island, now known as British North Borneo, and covering an area of over 30,000 square miles. Besides Brunei, other leading towns in Borneo are Banjermassin, Kuching, Pontianak, and Sambas. In British North Borneo the chief settlement is Sandakan or Elopura, the capital.

Borneol. [CAMPHOR.]

Bornholm, a Danish island in the Baltic, covers an area of over 200 square miles, and is 90 miles E. of Zealand and 25 miles S. of Sweden. Excepting at Rönne, the capital on the W. coast, the island is destitute of good and safe harbours. It is fertile in the main, agriculture, cattle raising, and fishing being the staple support of its inhabitants. It yields also good building-stone, marble, porcelain-clay, and an inferior quality of coal.

Bornu, or BORNORO, a Central African country, in the Soudan, lies on the W. side of Lake Tchad and on the S. of the Sahara. It is for the most part flat and fertile, and covers an area of about 80,000 square miles. Its rivers, of which the Shary and the Komadugo Yaobe are the chief, flow into Lake Tchad, on the W. shore of which is Kuka, the capital, and one of the best markets in Central Africa. The chief products are barley, beans, cotton, indigo, maize, and millet; and the wealth of the inhabitants lies mainly in slaves and cattle, the horses of Bornu being famed throughout the Soudan. The mass of the people are negroes, and the dominant race, called Shouas, are of Arab descent and Mohammedans.

Boro Budor, the ruin of a Buddhist temple in the residency of Kadu, Java, is situated near the confluence of the Ello and Progo. It is the most splendid monument of Buddhist architecture extant,

and is referred by Javanese chroniclers to the 7th century. It is pyramidal in form, the sides at the base measuring over 500 feet each. It is richly ornamented in figures of Buddha, scenes from his life, and representations of battles, processions, chariot races, and other designs.

Boron (symbol B=10·97), a non-metallic element, first isolated by Gay-Lussac and Thénard in 1808. It does not occur free in nature, but combined with other elements is found as boracic acid (q.v.), borax (q.v.), boracite (q.v.), borocalcite, and other minerals. It is a greenish brown powder, which is only obtained by difficult chemical processes. It forms an oxide (B_2O_3), which by union with water forms boric or boracic acids. It also forms a number of compounds with other elements, but none of any commercial or industrial importance.

Bororo, a large Brazilian nation occupying the whole region between Cuyaba and Goyaz. The Bororo were lately visited by Dr. Ehrenreich during his journey from Paraguay to the Amazon river. They are the chief nation in Matto-Grosso, and formerly ruled over a vast territory, but were reduced about the middle of the 17th century by Antonio Pires de Campo, who founded Santa Anna, Lonhosa, and other settlements in their domain.

Borough. A borough is distinguished from other towns by possessing, or having at some time of its history possessed, the right of sending a member or members to Parliament, and where the right of election is by burgage tenure, that alone is a proof of the antiquity of the borough. Now "borough" almost invariably means either a borough corporate (or municipal borough) or a parliamentary borough. In 1900, borough councils were established in London, taking the place of the old vestries, with additional powers.

Borough-English, the name given to that mode of inheritance by which the youngest son in some parts of England succeeds to landed property to the exclusion of his elder brother. The term is derived from a report in the first Year-book of Edward III., where *burgh-Engloyes* is used to distinguish this right from *burg-Francoyes*, the right of the eldest son. *Borough-English* is sometimes made to include analogous customs, by which preference is given to remote heirs, and for these customs Elton (*Origins of English History*, ch. vii.) proposes to employ the term "ultimogeniture," as suggested by the Real Property Commissioners, or to coin a new phrase like "juniority," or "junior-right." In Hampshire this custom is known as "cradle-holding." Many explanations of this mode of succession have been suggested, but none is satisfactory.

Borromean Islands, a group of four islands in Lago Maggiore, N. Italy. They are named after the family of Borromeo, one of whom—Vitelliano—in 1671 converted three of them into gardens. They are named: Isola Bella, the most celebrated, and having a palace of the Borromeo family with fine paintings and other works of art, and a remarkable garden, with rare exotic trees and shrubs; Isola Madre, the largest, Isola San Giovanni, and Isola Superiore or Isola dei Pescatori, inhabited by fishermen.

Borromeo, (1) CARLO, saint and cardinal, was born in 1538 at Arona, on Lago Maggiore. After studying the civil and canon law he was in 1560 appointed by his uncle, Pope Pius IV., apostolical prothonotary, and subsequently Cardinal and Archbishop of Milan. He was an important factor in the success of the Council of Trent, and principal contributor to the *Catechismus Romanus*. He founded and endowed colleges, seminaries, and communities, and devoted himself to good works, spending his revenues on the poor. He died in 1584, and was canonised by Pope Paul V. in 1610. Besides the *Noctes Vaticanæ*, his literary remains comprised homilies, discourses, sermons, and letters, published in 1747. A colossal statue of him in bronze overlooks Arona. (2) COUNT FREDERIGO, nephew of the preceding, born in 1564, was also Cardinal and Archbishop of Milan, 1595–1631. He, founded the Ambrosian library.

Borrow, GEORGE HENRY, writer and philologist, was born in 1803 at East Dereham, Norfolk. His early career is known only as given in his book *Lavengro*, a gipsy appellation meaning "word-master," and which was early applicable to him. He was much addicted to associating with gipsies and became intimately acquainted with their manners and customs and their language. In 1833 he became an agent of the Bible Society, and in this capacity visited Russia, Portugal, Spain, Morocco, and other continental countries. In 1840 he married Mary Clark, the widow of a naval officer, and settled on her estate at Oulton, near Lowestoft, where the gipsies always had a welcome pitch for their tents. He was fond of open-air life, a lover of horses and boxing. Besides *Lavengro* he also wrote *The Zincali, or Gypsies of Spain*, 1840 *The Bible in Spain*, 1843, *The Romany Rye*, 1857, *Wild Wales*, 1862, and *Dictionary of the Gypsy Language*, 1874. He died in 1881 at Oulton.

Borrowdale, a valley of W. Cumberland in the English lake district, celebrated for its beauty. It is five miles S. of Keswick at the head of the Derwent, and was once famous for its plumbago.

Borstal system, a scheme for dealing with male prisoners between 16 and 21 years of age. The system was first tried at Bedford prison in 1900, and thence transferred to Borstal. The scheme works on the basis of the "indeterminate" sentence, the magistrate fixing the maximum sentence, discretion being allowed to the prison committee to remit a portion if the prisoner is likely to benefit by his release. Trades are taught, moral and religious influences are brought to hear upon each prisoner, and habits of industry and the cultivation of self-respect inculcated and encouraged.

Borthwick Castle, a ruined tower near Edinburgh, dates from 1430. It is 74 feet long, 69 feet wide, and 110 feet high. Queen Mary and Bothwell resided here for a few days in 1567.

Bory de St. Vincent, JEAN BAPTISTE GEORGE-MARIE, naturalist, was born in 1780 at Agen. While still a boy he attracted the attention of the Society of Natural History at Bordeaux, and in 1798 set out with Baudin's expedition to Australia as naturalist, but left the vessel at Mauritius and explored Bourbon and other E. African islands. He was present at the battles of Ulm and Austerlitz, went in 1808 with Soult to Spain, and served as a colonel at Waterloo. In 1829 he led a scientific expedition to the Morea and in 1839 to Algeria. His chief works are *Annales des Sciences Physiques* (8 vols.); *Voyage dans les quatre principales Iles des Mers d'Afrique; Expedition Scientifique de Morée; L'Homme: Essai Zoologique sur le genre Humain.* He died in 1846.

Boscan-Almogaver, JUAN, poet, was born about 1490 at Barcelona. Coming to Granada he resided at the court of Charles V. He is distinguished as being the father of the Spanish sonnet. His poems were published first in 1543, the year after his death.

Boscawen, THE HON. EDWARD, third son of Hugh Viscount Falmouth, by Charlotte Godfrey, niece of the great Duke of Marlborough, was born on Aug. 19th, 1711. Little is known of his earlier years, save that he went to sea as a midshipman at the age of twelve, became a lieutenant in 1732, and having been promoted to be captain in 1737, was soon afterwards given command of the *Leopard*, 50. In 1739, upon the outbreak of war with Spain, he commissioned the *Shoreham* and was sent to the West Indies, but, his ship being out of repair, he obtained permission to leave her and accompany Admiral Vernon as a volunteer in the successful attack upon Porto Bello. Returning in the *Shoreham*, he participated in the less fortunate attempt upon Carthagena in 1741, and there gained great distinction. While engaged in this service he was transferred to the *Prince Frederick*, 70, in which he came back to England in 1742. Thenceforward he cruised for about three years in the Channel, taking among many other prizes the French frigate *Médée*, commanded by M. de Hocquart, who, curious to relate, was twice subsequently captured by the same commander. Having for a season been captain of the *Royal Sovereign*, he passed in 1746 to the *Namur*, 74, and, cruising again in the Channel, made many more captures. On May 3rd, 1747, he was present at Anson's action with De Jonquières, and was severely wounded. In the same year he became a rear-admiral, and was appointed commander-in-chief in the East Indies, as well as general of the land forces there. An attack which he made on Mauritius failed, as did also one on Pondicherry; and the disasters of the expedition culminated with the loss, in a hurricane, of the flagship *Namur*, the *Pembroke*, and the *Apollo*, with the greater part of their crews. The admiral returned to England in 1750. In the following year he was appointed a Lord of the Admiralty, and in 1755 became a vice-admiral and was again given command afloat, this time in North America. In 1758 he reached the rank of full admiral, and, with his flag in a new *Namur*, 90, took command of the expedition against Louisbourg, for his success in which he received the thanks of the House of Commons. In 1759 he once more hoisted his flag as commander of a squadron destined for the Mediterranean. M. de la Clue, who commanded a French force in Toulon, had the temerity to venture out during Boscawen's temporary absence from off that port, and was on Aug. 18th, 1759, brought to action and signally defeated, after a two days' running fight. As a reward, Boscawen was appointed a general of marines with a salary of £3,000 a year. In 1760 he was again at sea, but was unable to effect anything of importance. On Jan. 10th, 1761, he died at his seat at Hatchlands Park, Surrey. He was buried in the church of St. Michael, Penkevel, Cornwall.

Boscobel, famed in history for being the hiding-place of Charles II. after the battle of Worcester, 1651, is on the eastern confines of Shropshire. The "Royal Oak," in which he hid himself, is represented now by a tree grown from an acorn of the original tree. Boscobel House still stands.

Boscovich, ROGER JOSEPH, mathematician. was born in 1711 at Ragusa in Dalmatia. He solved the problem of finding the sun's equator, and calculated the time of its rotation by observations of the sun spots. After being appointed mathematical professor in the *Collegium Romanum*, he was employed by Pope Benedict XIV. in different undertakings, measured in 1750–53 a degree of the meridian in the States of the Church, visited London in 1760 on behalf of the interests of Ragusa, and in 1764 became professor in mathematics at Pavia, which he held with the directorship of the observatory of the Brera at Milan. He subsequently visited Paris, was appointed director of optics for the navy, and received a pension of 8,000 livres. He died insane in 1787. His works comprise a great variety of treatises on mathematical and physical subjects. But he is probably best known by his theory that all bodies are composed of atoms or unextended centres of force, each of which attracts or repels all the rest.

Bosio, FRANÇOIS JOSEPH, BARON, sculptor, was born in 1769, at Monaco. He acquired a reputation through the figures he executed for the column in Place Vendome. Besides Napoleon, Louis XIII. and Charles X. also patronised him. He died in 1845, while holding the position of Director of the Academy of Fine Arts in Paris.

Bosna-Serai, or SERAIEVO, capital of Bosnia, is situated on the Miljatzka, a tributary of the Bosna, and is the centre of the trade of the province. It has a palace built by Mohammed II., and an old castle; formerly it was encompassed by walls. Since 1878 it has belonged to Austria, and manufactures articles in copper and iron.

Bosnia was a Turkish province, placed by the treaty of Berlin in 1878 under the administration of Austria-Hungary, but by an autograph letter, dated Oct. 5, 1908, addressed to the Premiers of Bosnia and Herzegovina, Francis Joseph I. annexed the two States to Austria-Hungary. Bosnia is situated in the north-west of the Balkan peninsula. Its

surface, which, with Herzegovina, the southern portion, and Novi-Bazar, covers an area of about 24,000 square miles, is for the most part mountainous, and is traversed by the Dinaric Alps. Its chief rivers are the Save, Verbas, Bosna, Rama, and Drina. It is chiefly a pastoral country. It yields coal, antimony, manganese, and iron; and has industries in fire-arms, leather, woollens, cottons, and gunpowder. The inhabitants are Mohammedans for the most part, and of Slavonian origin.

Bosporus, or BOSPHORUS, a narrow strait about seventeen miles long, and from a third of a mile to two miles wide, connecting the Black Sea with the Sea of Marmora, and separating Europe from Asia. It is strongly defended by forts, and no ship of war belonging to any nation other than Turkey may pass through it without the permission of Turkey. On its W. side stands Constantinople on a gulf of the Bosporus called the Golden Horn. The banks of the channel present beautiful scenery, being lined with palaces, kiosks, villages, and beautiful residences, interspersed with magnificent gardens. From the north-east there is a continual surface-current, with a reverse under-current. The channel is about 30 fathoms deep and the navigation safe.

Bosquet, PIERRE FRANÇOIS JOSEPH, marshal, was born in 1810, at Mont de Marsan in Landes. He rendered signal services in the Crimea at the battles of Alma and Inkermann, and was wounded at the storming of the Malakoff. In 1856 he was made a marshal in the French army, and appointed a senator, and in 1861 he died.

Boss (Dutch, *baas*, master, perhaps originally uncle; cf. German, *base*, aunt or female cousin). In American slang, a master or employer of labour —in this sense, no doubt, derived from the Dutch settlers in what was afterwards New York state. Also, the wire-puller of a political organisation. "Boss Tweed," the leader of the corrupt and infamous Tammany Ring, was a familiar figure in New York municipal politics in 1871.

Bossuet, JACQUES BÉNIGNE, orator and theologian, was born in 1627 at Dijon. Destined for the Church from an early age, he was educated in the Jesuits' college at his native place, proceeding in 1642 to Paris, where he continued his studies at Collège de Navarre. Ordained priest in 1652, he became a canon of Metz, and soon distinguished himself by his *Refutation du Catechisme de Paul Ferry*, a Protestant divine. In 1669 he was appointed to the bishopric of Condom, and in 1670 tutor to the Dauphin, for whose edification he wrote *Discours sur l'Histoire Universelle*, and other works. In 1680 he was elected to the Academy of France, and in the following year was raised to the see of Meaux. In 1682 his *Exposition de la Doctrine Catholique*, which had been written in 1669, was published, and created great excitement in the Church. Made a member of the Council of State in 1697, he in 1698 became first almoner to the Duchess of Burgundy. The occupation of Bossuet's life, which ended in 1704 at Paris, was controverting Protestantism, and defending the rights and liberties of the Gallican Church.

Bossut, CHARLES, mathematician, was born in 1730 near Lyons, and appointed professor at Mézières in 1752. After the revolution he taught in the polytechnic schools, Paris. His chief work was *Essai sur l'Histoire Générale des Mathématiques*. He also edited Pascal's works. He died in 1814, at Paris.

Boston (contracted from *Botolph's Town*, St. Botolph having founded a monastery here in the seventh century) is a parliamentary and municipal borough in Lincolnshire, and is situated in a rich agricultural district on the estuary of the Witham, which divides the town into two parts, and is here crossed by an iron bridge. A leading feature in the town is the parish church of St. Botolph, with its tower, close on 300 feet high, which forms a landmark for miles round by land and sea. There is also a chapel, built by the citizens of Boston in America, to the memory of Thomas Cotton, a former vicar. The harbour accommodation has recently been greatly improved, ships of 2,000 tons being able to reach the centre of the town, and the commerce has correspondingly increased. Besides the railways, it has communication with Lincoln, Gainsborough, Nottingham, and Derby, by river and canals. Its manufactures embrace ropes, sails, agricultural implements, leather, bricks, etc. It was the birthplace of Fox, the author of the *Book of Martyrs*. Pop. (1901), 15,667.

Boston, in the United States, the capital of the New England State of Massachusetts, stands on a peninsula that projects into Massachusetts Bay at the mouth of the river Charles. Among its suburbs is Cambridge, the seat of Harvard University, and Charlestown, from which it is divided by the Charles river, was the scene of the battle of Bunker Hill. Boston enjoys good harbour accommodation, and is the termini of many lines of railway. Its trade is extensive, and its manufactures varied. It is also among the best built of American cities, having spacious regular streets, parks, and many public buildings of architectural merit. It is well supplied, too, with religious, charitable, and educational institutions; the latter comprising, besides 400 elementary and fifty grammar schools, theological, legal, medical, technical, and musical colleges, open, for the most part, to both sexes. Founded in 1630, Boston is associated with the leading events in American history. Here was published the first American newspaper in 1704, and here the British-taxed tea was thrown into the harbour in 1773.

Boston, THOMAS, divine, was born in 1677, at Dunse, Berwickshire. Educated at the University of Edinburgh, he was, in 1699, appointed minister of a Berwickshire parish, and in 1707 of Ettrick, Selkirkshire. His chief works were *Human Nature in its Fourfold State*, *The Crook in the Lot*, and his *Autobiography*. Through their wide sale these

books had a great influence upon the mind of the Scottish people.

Bostryx, a form of inflorescence, sometimes called a helicoid cyme, in which there is a sympodium or pseudaxis of successive flower-bearing branches so arranged in succession towards one side, either right or left, of the preceding one as to form a spiral. It occurs in the day-lily (*Hemerocallis*), and in the secondary branching of the common St. John's-wort (*Hypericum perforatum*).

Boswell, JAMES, biographer of Johnson, was born in 1740 at Edinburgh, where he was educated at the university and at Glasgow. He was always of a literary turn, and in 1762 published *The Cub at Newmarket*, a humorous poem, and in 1763 *Letters between the Hon. Andrew Erskine and James Boswell*. In this same year he made the acquaintance of Dr. Johnson in the back parlour of Tom Davies's shop, in Russell Street, and a close intimacy at once sprang up between them. He then proceeded to Utrecht to study civil law, where he received an allowance of £240 a year from his father, Lord Auchinleck, a judge of the supreme court in Scotland. After leaving Utrecht university he travelled on the Continent, visiting Voltaire and Rousseau, and returned in 1766 to England, where he published in 1768 his *Account of Corsica, Journal of a Tour to that Island, and Memoirs of Pascal Paoli*. In 1769, after various love affairs, Boswell married a cousin, Margaret Montgomery, a relative of the Earl of Eglinton, and in 1773 he removed to London, where he was admitted as a member of the Literary Club, and immediately set out with Johnson on the famous journey to the Hebrides. In 1785 appeared the *Journal of a Tour to the Hebrides*, the year after his last meeting with Johnson at Sir Joshua Reynolds'. His *Life of Johnson* appeared in 1791, and was rapidly bought up. Though on the death of his father in 1782 he had fallen heir to an estate worth £1,600 a year, he was yet usually far from solvent, and after his wife's death in 1789 his drinking habits grew upon him. Towards his death, which occurred in 1795, he had become an habitual drunkard.

Bosworth, an English town in Leicestershire, is celebrated as being near Bosworth Field, the scene of the termination of the Wars of the Roses, where Richard III. was slain in battle in 1485.

Bosworth, JOSEPH, philologist, was born in 1790 in Derbyshire. In 1817 appointed vicar of Little Horwood, Bucks, he gave special attention to the study of Anglo-Saxon. After other ecclesiastical appointments he became in 1857 professor of Anglo-Saxon at Oxford, and gave £10,000 to found a chair of Anglo-Saxon at Cambridge. His chief works are *Anglo-Saxon Grammar, Dictionary of the Anglo-Saxon Language*, and *Compendious Anglo-Saxon and English Dictionary*. He died in 1876.

Böszörmeny, a Hungarian town, capital of the Haiduck district, 14 miles N.W. of Debreczin.

Botallack Mine, on the W. coast of Cornwall, England, seven miles W. of Penzance, yields copper and tin, and extends far under the sea. The neighbourhood is a favourite tourist resort.

Botanic Gardens, gardens for the cultivation of plants for scientific study, have done much for the advancement of botany. They were originally "physic gardens," devoted mainly to medicinal plants, and either the private property of apothecaries, or connected with the medical schools of universities. The earliest known public botanic garden, that of Padua, was founded in 1533; those of Florence and Pisa, in 1544; Bologna, in 1547; Zurich, in 1560; Paris, in 1570; Leyden, in 1577; Leipsic, in 1579; Upsala, in 1627; Oxford, in 1632; Edinburgh, in 1670; Chelsea, in 1673; and Kew, about 1730. Of late years many fine gardens have been established, especially in the capitals of our British colonies.

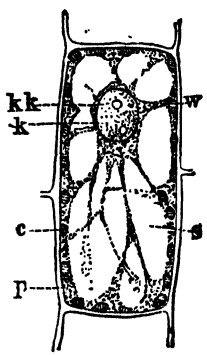
Botany, from the Greek *bŏtanē*, a herb, is that division of biology (q.v.) which deals with plants.

In endeavouring, therefore, to define the province of botany as a science, we have to attempt to distinguish the essentials of plant-life from those of animal-life. There is, however, no recognisable line of demarcation between what are sometimes called the two kingdoms of organic nature. Like animals, plants consist largely of protoplasm (q.v.); but most plants differ from most animals in containing relatively less of this substance in an unaltered form and, as a consequence, less nitrogen. Whilst most animals are mainly built up of numerous cells not enclosed in any definite membranes, known as plastids (q.v.), most plants are made up of cells each enclosed in a definite cell-wall composed of cellulose (q.v.) $(C_6H_{10}O_5)^n$, a comparatively simple non-nitrogenous compound. The green colouring matter known as chlorophyll (q.v.), though present in most plants, is absent in fungi and some others, whilst it occurs in a considerable number of the lower animals, so that it is not distinctive, and the same must be said of both starch and cellulose. Nor is there any universal physiological distinction. Motion, characteristic of most animals, at least at some period in their lives, occurs in many of the lower plants, and though muscle and nerve, those highly specialised organs of motion, are confined to animals, they do not occur in all animals. The respiration (q.v.) of plants and animals only differs in amount, plants in this respect rather resembling cold-blooded animals; but in the case of green plants in daylight the effect of respiration upon the air is masked by the far more active function of the chlorophyll. This chlorophyllian function, as it is called, consists in the taking in of considerable volumes of carbon-dioxide (CO_2) from the air and the giving out of proportionately large volumes of oxygen. It is a purely nutritive, not a respiratory act, and occurs also in green animals. The chief contrast between plants and animals is undoubtedly in the nature of their food. Plants take in liquid food, generally by roots from the soil, and gaseous food, mostly by their leaves, from the air, this food being inorganic and being built up in the plant into organic compounds. Animals take in solid food, but require it

to consist of organic compounds. The exceptions to this rule are the insectivorous plants (q.v.) that digest solid organic food; fungi (q.v.), which cannot construct starch or sugar with the carbon dioxide of the air; some parasitic plants; some that are saprophytic, living upon decaying organic matter; and the green animals already mentioned.

We may define a plant as a living being of one or more cells, or partly of structures formed from cells, these cells being surrounded by a cellulose wall, the plant usually containing chlorophyll, subsisting upon inorganic food and not possessing the power of motion.

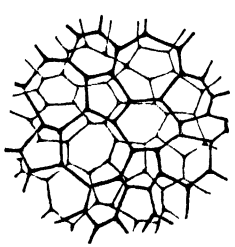
Botany may be divided into *Pure*, *Mixed* and *Applied*. Pure Botany, the study of plants in themselves, can be considered under the two aspects of *anatomy*, or structure, and *physiology*, or function. Anatomy is perhaps most conveniently divided into *histology*, the science of tissues or of microscopic structure, and *organography*, that of external form.



TYPICAL PLANT-CELL.

p, Cell-wall. *w*, Protoplasm forming primordial utricle and strands. *s*, Vacuole filled with cell-sap. *c*, Chloro-plastid. *k*, Nucleus. *kk*, Nucleolus.

Though we cannot here enter into the details of the science, we may state some of the leading facts under each subdivision. Though most plants are made up of numerous cells, this description is inapplicable to others, to which the name *unicellular* is commonly applied. These lowest forms, whether fungal, such as the *Myxomycetes* (q.v.) and *Schizophyta* [BACTERIA], or algal, such as *Caulerpa*, in which there is apparently a distinct root, stem and leaf, have no internal partitions of cellulose. Most plants, however, not only originate in a single egg-cell, *ovum* or *oospore* (q.v.), but, by its repeated division, become *multicellular*; and, at an early stage in their development, differentiation takes place, groups of similar cells forming *tissues* and performing special functions. Thus structural differentiation is accompanied by physiological division of labour and there is an intimate connection between histology and function. The whole body of the *embryo*, or young plant, in its earlier stages, or the growing point of the root or stem of one of the higher plants, consists of a tissue of small, rounded cells, known as *parenchyma*, with thin walls, filled with protoplasm and thus capable of cell-division, or *merismatic*. An external cell-layer or *epidermis* of tubular cells without protoplasm is commonly soon differentiated, and in some cases also a central *bundle* of elongated cells (*prosenchyma*), some of which may become fused together by the loss of their transverse partitions into *vessels*. The outer cell-walls in aërial structures commonly become corky or *cuticularised*, thus serving to check transpiration or decay from surrounding damp; whilst between certain superficial cells (*guard-cells*) are adjustable openings [STOMATA] regulating transpiration. The vessels just mentioned are essentially a *conducting-tissue* conveying the liquid food, their walls being generally strengthened against collapse by internal *thickening-bands* of cellulose. Other tissues, of which wood is the best-known example, are termed *mechanical*, as adding to the rigidity of such structures as a stem. In a leaf, besides the epidermis with its transpiration-pores or stomata, we have (i) more rigid veins, made up of tough but flexible *bast-fibres* (mechanical) and spirally-thickened vessels (conducting); (ii) green cells so closely packed below the upper epidermis as to be called *palisade-cells*, specially adapted to *assimilation*, the building up of organic compounds from atmospheric carbon; and (iii) loosely-arranged cells below these, giving the paler green colour to the underside of the leaf, with large intercellular spaces communicating with the lower stomata, the *transpiration-tissue*.



DODECAHEDRAL PARENCHYMA.

THALLOID STEM OF MARCHANTIA, WITH FEMALE BRANCHES.

THE SAME, WITH MALE BRANCHES.

As in the lowest plants or in the earliest stages of higher plants there is no histological distinction between such tissues as these, so too there is little or no distinction in external form or structure between various parts such as root, stem and leaf.

Some of the larger sea-weeds, for example, may have root-like holdfasts, rounded stem-like parts, and others flattened and more leaf-like; but the one passes into the other with no articulation nor any difference in internal structure. Such an indeterminate structure is termed a *thallus*, and the plants which exhibit them, the Algæ and Fungi, are called *Thallophyta*.

Mosses are the lowliest plants in which we can be said to have a true distinction between the *stem* as an axis and the *leaf* as a distinct lateral appendage to it; whilst not until we ascend to the still higher grade of the ferns do we meet with the *root* as a true axial absorbent organ. The parts of a plant considered from the physiological point of view of what function they perform are termed *organs*. From a purely anatomical point of view they may all be shown to result from the modification of a small number of primitive structures known as *members*, of which the chief are the thallus, axis, leaf and hair, sometimes termed respectively thallome, caulome, phyllome and trichome. Whilst parts performing the same function are said to be *analogous*, those referable to the same structural type or member are said to be *homologous*. As it has been found necessary to base our system of classification upon structure rather than upon function, the study of homologies becomes of extreme importance. The spines of the blackthorn, for instance, are the ends of short branches; those of the Robinia, parts of the leaf (stipules), and the prickles of the rose, distinct superficial structures. The three structures are merely analogous. So too, whilst all tendrils are analogous, some, such as those of the vine, are stem-structures, others, such as those of the pea, are homologous to leaves. The term Organography is generally restricted to the description of the external forms of the parts of plants in general, the comparative study of their development (*embryology*) under certain general laws of form being distinguished as *morphology* (q.v.). Closely connected with organography are the rules and terminology employed in the scientific description of plants, the test of which is that an artist understanding the terms should be able to draw the plant from the description. This is called *Descriptive Botany*.

As our classification of plants depends upon structure, whilst organography deals with the structure of plants generally, there is a distinct department of anatomy known as *Special Anatomy*, which treats of those structures peculiar to each group. The rules for the classification of plants, or by some writers, the classification itself, are termed *Taxonomy*, closely connected with which are the rules of *Nomenclature*, or naming plants. As to the former we can only mention here that "artificial" systems of classification, such as that of Linnæus (q.v.), based upon one set of characters, are being gradually superseded by an attempt to reconstruct the pedigree of the vegetable kingdom in a "natural system," taking all structural characters into account. As to nomenclature, the main rules are, that every plant has two names, one *generic*, which it may share with other allied forms, and the other *specific*, peculiar to one form; and that the first name given to any species in its correct genus in, or after the publication of, Linnæus's *Species Plantarum*, is that by which it ought to be known.

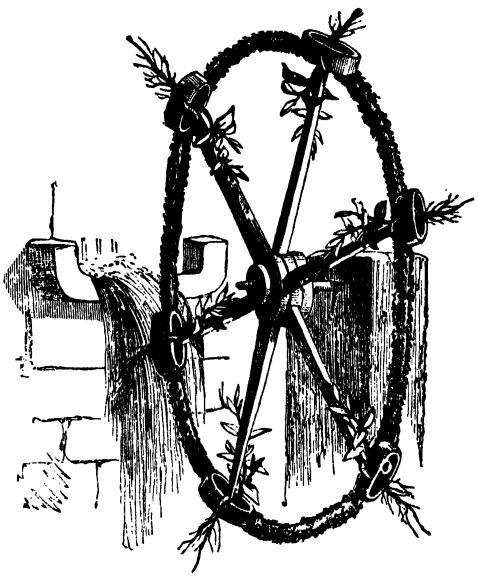
Passing on to Physiology, the second main division of Pure Botany, we may remark that the functions of the various parts of plants are almost all of them either nutritive or reproductive, the functions of relation, such as motion, sensation, and the special senses, which are so important in the higher animals, being hardly represented among vegetables. The sensitive hairs on the leaf of the Venus' Fly-trap are one of the most strikingly exceptional cases. Plant nutrition can perhaps be best understood by first considering the life of the individual cell (q.v.), after which the action of root and leaf as feeding organs and of the stem as an organ of food-transfer can be considered. Much light is thrown upon this study by organic chemistry (q.v.), the composition of the soil, what different species remove from it, and the composition of the plants themselves and their various organs at various stages of development being most important. Experiments in *water-culture*, or the growth of plants in solutions of known composition, have done much to show what chemical elements are, and what are not, essential to the life of the plant, substances physiologically useless being commonly taken in by roots. Whilst anatomy is a purely observational study, physiology may be largely experimental in all its departments, the placing the plant under known artificial conditions often explaining functions more clearly than mere observation of the same plant in a natural state can do.

As the result of nutrition, growth is naturally the next subject of study, its rate, direction, and modification by external agencies being the chief heads under which it is considered. Knight's machine, a revolving wheel, is a simple demonstration of the law of "geotropism," that roots grow towards and stems away from the centre of gravity; and it is important to bear in mind that though moisture, oxygen, and a certain warmth are necessary for growth, and light is necessary for the assimilation of inorganic carbon, light generally retards growth. Thus stems are generally *heliotropic*, bending towards the light, because their illuminated side grows more slowly.

The movements of plants are partly connected with their unequal growth, as in the unfolding of buds and the "nutation" or nodding of leaves and shoots; and partly with reproduction, the latter class of movements being mostly "irritable," or acting in response to a stimulus and not spontaneously.

Reproduction is either *vegetative*, as by bulbils, offsets, or runners, or *sexual*. The former is simply the discontinuous growth of one individual, so that the offspring precisely resembles its one parent. Sexuality, the fertilisation of an ovum or germ cell by a sperm cell, brought about by the most varied means, introducing the fluctuating influence of two parents, brings about the phenomena of variation among seedlings. In the lowest

plants sexuality does not seem to have been attained, reproduction taking place simply by fission or bi-partition. Slightly higher in the series we have conjugation, the union, as in *Mucor* and *Spirogyra*, of two similar cells. In the bladder-wrack sea-weed, and apparently in most higher plants, we get the union of a relatively large germ-cell with numerous smaller sperm-cells. In several large groups of plants (CRYPTOGAMIA) these sperm-cells are detached portions of protoplasm, either free-swimming ciliated "antherozoids" (q.v.), or non-ciliate "spermatia." In flowering plants the male element is merely the formless protoplasm within a "pollen-tube" emitted by a "pollen-grain," which becomes detached from the male organ or "stamen." Lastly, we have many large groups, especially among fungi, in which sex seems to have been lost, some sexual organs still remaining. [APOGAMY.] In connection with this subject we have to consider the various agencies by which the pollen-grains are conveyed to the female organ. These are chiefly wind and insects, and many subordinate parts of the higher plants, constituting the "flower," are specially adapted to secure their action. Thus wind-pollinated plants often flower when bare of leaves, having pendulous catkins of inconspicuous flowers with exposed stamens, yielding abundant fine-grained, round, and smooth pollen, and their stigmas, the sticky receptive surfaces of the female organs, feathery. Insect-pollinated flowers, on the other hand, are commonly conspicuous, bright-coloured or strongly scented, secreting honey from glands indicated by dots, lines, or other variegations, and producing large pollen-grains, the surfaces of which are commonly furnished with spines, knobs, or ridges, by which they are entangled in the hairs on the insect's body. Some plants again are adapted for self-pollination, and may even have some flowers, as in the violet, *cleistogamous*, *i.e.* fertilised without unfolding. Closely connected with fertilisation are the questions of hybridism, the possibility in many cases of obtaining fertile seed from the pollination of a flower by pollen from a distinct species. *Rhododendron* and *Azalea* and many genera of orchids even produce *bigeners* or bigeneric hybrids, in which the parent species belong to two different genera, and the hybrid seedling may even be fertilised by a third genus, and so on. When, as the result of fertilisation, the ovule, or immature seed of a flowering plant, has developed into a *seed* with its store of food-substances, either in the embryo or in the surrounding tissue or *albumen*, the questions of seed-dispersal and of germination arise. Seeds are commonly furnished with a tough, impermeable outer coat, resisting even the action of sea-water or digestive acids, and checking premature germination. If small, they may be carried by wind, and they may have tufts of hair, as in the willow, or wing-like membranes, as in the pine. The variously formed fruits in which they are enclosed may, if dry, be small and be similarly provided with a *pappus* of hairs, as in the thistles, or with wings, as in the sycamore; or may adhere by hooks or bristles to the wool or fur of animals; or may burst elastically, as in the balsam; or, if succulent, may attract birds or other animals, and be eaten, whilst the seed they enclose is rejected undigested.



KNIGHT'S MACHINE.

In the ripe seed there is generally some store of starch, oil, aleurone (q.v.), or other food material. Under the suitable conditions of warmth, moisture and oxygen, the seed absorbs water and swells, and fermentative changes, such as the conversion of insoluble starch into soluble malt-sugar, take place within, and the *radicle*, or primary root of the embryo, bursts its way out, followed immediately in some cases by the *cotyledons*, or embryonic leaves, and in others by the *plumule* or primary bud of the axis.

Anatomy and physiology thus dealing with the entire structure and life history of plants, Mixed Botany, in which the science is mainly subsidiary to geography and geology, deals with the distribution of plants in space and time. [DISTRIBUTION.] In Palæozoic rocks the only known plant-remains are Cryptogamia (q.v.), or flowerless plants, and Gymnospermia (q.v.), or cone-bearers, Angiospermia, or ordinary flowering-plants, apparently originating in the Secondary period, not till the close of which did Dicotyledons (q.v.) become numerous. This branch of botany is termed *Palæobotany* or *Palæophytology*.

The science of botany is applied to various arts, plants and vegetable products being put to so many and so various uses. Thus Applied **Botany** is practically co-extensive with *Economic Botany* or *Vegetable Technology*. Vegetable products include food substances for men and animals, materia medica, oils, gums, dyes, tanning materials, fibres,

paper-materials, timbers and others, each class forming the subject of a separate department of the study. Materia medica or pharmaceutical botany has been most carefully investigated from the points of view of both the chemist and the systematist. The study of useful plants when alive forms the subject of agricultural, horticultural and arboricultural botany.

Botany Bay, an inlet on the coast of New South Wales, was discovered in 1770 by Captain Cook, and received its name from Joseph Banks, the botanist of the expedition, on account of its varied flora. In 1787 it was formed into an English penal settlement.

Bot Flies, a family of flies known as the Œstridæ, of which the larvæ are parasitic on various mammals; thus *Gastrophilus* lives in the stomach of the horse, and *Œstrus*, the type-genus, in the nasal cavities of sheep. The common name is derived from the fact that the swellings known as bots on the skin of cattle are caused by the larva of *Hypoderma*, a genus of this family.

Both, Andrew and John, painters, were born in 1609 and 1610 respectively at Utrecht. In Italy, where they became renowned, John painted landscapes, and Andrew put in the figures, the whole appearing to be the work of one individual. Andrew was drowned in 1650 at Venice. John, returning to Utrecht, died a year later.

Botha, Louis (b. 1864), Commandant-General of the Boer forces after the death of Joubert in the war 1899–1902. He proved himself at Colenso and Spion Kop a general of marked capacity, and later on with De Wet (q.v.), controlled the guerilla warfare successfully carried on for so many months. He was one of those who signed the terms of Peace agreed to in May, 1902. When responsible government was granted to the Transvaal he became the first Prime Minister in 1907, and came to England to represent the Colony at the Imperial Conference.

Bothnia, formerly a province of Sweden, divided into E. and W. Bothnia by the gulf of that name. East Bothnia is now embraced in Finland, and West Bothnia in the Swedish province of Norrland.

Bothriocephalus latus, a parasitic worm belonging to the class *Cestoda*. It is nearly allied to *Taenia solium*, the common tapeworm, but attains a larger size than that parasite, some specimens being as much as 25 feet in length. The adult form occurs in man, in dogs, and in cats; it is, however, only met with in certain parts of Europe. Dr. Braem, of Dorpat, has shown that the embryo or cysticercus form inhabits the muscles and viscera of certain pikes and eels; and if such infected fish be eaten by man in a half-cooked condition, the parasite obtains access to the human intestinal canal, where it undergoes its remarkable development. The embryo attaches itself by its hooklets to the wall of the intestine, and rapidly increases in length by the growth of a series of segments. The adult worm has no hooklets, but is provided with two suckers; the segments are as a rule broader than they are long, and the genital sore is situated in the middle of the flat surface, and not laterally as in the common tapeworm. For the measures employed to expel such parasites, *see* Tapeworm.

Bothriocidaroidea, an order of the Echinoidea which is characterised by the possession of 15 zones of plates instead of the normal 20 (*cf.* Echinus). It includes only one genus *Bothriocidaris*, from the Silurian rocks of Russia. This is the oldest known Sea Urchin.

Bothwell, a village in Scotland, Lanarkshire, is situated on the Clyde, about eight miles S.E. of Glasgow. The river is here crossed by Bothwell Bridge, the scene of the battle so named between Monmouth and the Covenanters in 1679. Near the village are the ruins of Bothwell Castle, a former stronghold of the Douglases, and Bothwellhaugh, whence was named James Hamilton, the regent Murray's assassin.

Bothwell, James Hepburn, Earl of, was born about 1530. Until the death of his father in 1556 nothing is recorded of him. Four years later he appears to have gone on a mission to France, when for the first time he saw Queen Mary, who made him a privy councillor in the following year, 1561. After an attempt to abduct the queen in 1562 he had to seek refuge in France, not appearing at the Scottish court after Mary's marriage with Darnley in 1565. In 1567, Feb. 9, after trying to induce Mary, during her visit to him at Hermitage Castle, to procure a divorce from Darnley, he murdered Darnley and carried off the queen to Dunbar Castle on April 24th. On May 15th they were married, and on June 15th the parting at Carberry Hill took place. Bothwell fled, but being ultimately captured was imprisoned in Draxholm Castle, where he died in 1577. Bothwell was described to Elizabeth by Throckmorton as "a glorious, rash, and hazardous young man, one whom his adversaries should have an eye to." According to other accounts he was thoroughly selfish and brutal.

Botocudos, a large wild tribe of the Brazilian coast range, between the Rio Dolce and Ilheos south and north, known from the earliest period of the discovery, and formerly very numerous, but now greatly reduced by the systematic butcheries of the Portuguese; type remarkably like that of the rude Mongolian people of Siberia—round flat features, small nose and oblique eyes, black lank hair, dirty yellowish complexion; wear round wooden disks as lip and ear ornaments, whence their name from the Portuguese *botoque*, a

Botocudo.

barrel plug; call themselves Nac-nanuk (Nac-poruk), *sons of the soil, i.e.* Aborigines. A few have become *Mansos, i.e.* half-civilised and settled; but the great majority (12,000 to 14,000) are still *bravos, i.e.* "wild," at a very low stage of culture, using stone implements, living in wretched hovels of branches, seldom more than four feet high, treating their women with barbarous cruelty, feeding on berries, grubs, snakes, lizards and human flesh; they are demon-worshippers, and their language, unlike any other known tongue, has no word for any numeral beyond *one* (*mocenam*); *uruhu*, said to mean *two*, really means "much" or "many." See A. H. Keane, *On the Botocudos* (1883).

Botryllidæ, a family of Tunicates known as the "Grape animals" from their resemblance to a bunch of grapes.

Botta, CARLO GIUSEPPE GUGLIELMO, historian, was born in 1766 in Piedmont. Studying medicine, he entered the French army as a physician in 1794, and in 1799 was appointed by Joubert a member of the provisional government of Piedmont. Though he led an active political life in a stirring period, he wrote several works, the chief being his *History of Italy*, from 1789 to 1814. He also wrote poems. His death occurred in Paris in 1837.

Botta, PAUL EMILE, traveller, son of the preceding, was born in 1802 at Turin. Appointed French Consul at Alexandria in 1833, he journeyed to Arabia in 1837 and published his observations in *Relation d'un Voyage dans l'Yémen* (1841). In 1843 he discovered the ruins of ancient Nineveh while consul at Mosul. These further explorations were published in *Mémoire de l'Écriture Cunéiforme Assyrienne* and *Monuments de Ninive*. Botta died in 1870, at Achères, near Poissy.

Bottesini, GIOVANNI, was born in 1823 at Crema, Lombardy. He became the greatest master of his time of the double-bass, and in 1846 was appointed director of the Italian Opera in Barcelona, Havana, Palermo, and Paris. His *Méthode Complète de Contre-basse* is a leading work. He died in 1889.

Botticelli, ALESSANDRO (1447–1515), a celebrated painter of the Tuscan school, celebrated for the singular beauty of expression which he gave to his Madonnas and Venuses. He was a pupil of Lippo Lippi (q.v.), and in his latter years came under the powerful influence of Savonarola. Acting under this influence he destroyed many works which had for their subjects scenes from classical mythology. He died in great poverty at Florence in 1515.

Böttiger, JOHANN FRIEDRICH, alchemist, was born in 1682 in Reuss-Schleiz. After fruitlessly searching for the philosopher's stone, the King of Saxony took him in hand, and made him experiment on porcelain, the result being the invention of the celebrated Meissen porcelain. He died in 1719.

Bottle, a vessel with a relatively narrow neck, for holding liquids. The earliest bottles mentioned in literature were of skins. They are referred to in the Bible and by many Greek authors, and are often still used in S. Europe for wine: they are of considerable capacity. Hollowed gourds, too, are an early type of bottle—the neck being made by tying the young gourd round with a string near the stalk. It is possible that the earliest earthenware bottles were made by coating these with clay and subjecting them to the action of fire. Earthenware bottles are common in the East. Modern bottles are made of glass or stoneware. They have also been made (to some extent for temporary use, *e.g.* for sending home vinegar from the grocers' shops) from paper in America of late years.

Bottlehead, BOTTLENOSE, or BEUKED WHALE, a popular name for either of the two species of the genus *Hyperoödon*, from the peculiar shape of the head, caused by the elevation of the bones of the upper jaw. These whales are found in the North Atlantic, frequenting the Spitzbergen seas in summer, and passing south in winter. They vary in colour, from black in the young to light-brown in the older animals; all are greyish-white beneath. A large specimen may attain a length of 30 feet. The oil from the head yields a kind of spermaceti when refined, and that from the blubber is scarcely distinguishable from sperm-oil. [CETACEA, DOLPHIN, WHALE.]

Bottomry. The contract of Bottomry is a pledge or mortgage of a ship to secure the repayment of money lent to its owner to enable him to carry on a voyage. It is usually in the form of a bond called a bottomry bond, the condition being that if the vessel be lost on the voyage, the lender loses the whole of his advance, but if the ship and tackle reach the destined port, they become immediately liable together with the person of the borrower for the money lent, and also for the premium or interest agreed to be paid upon the loan. Money is generally raised in this way by the master of a ship when he is abroad and requires money to repair the vessel, or to procure other things necessary to enable him to complete his voyage. This is allowed to be a valid contract by all trading countries for the benefit of commerce, and by reason of the extraordinary hazard run by the lender. The practice of lending money on ships or their cargo and sometimes on the freight is very ancient. It was common in Athens and other Greek commercial towns. The speech of Demosthenes against Lacritus contains a complete Bottomry contract, which clearly indicates the nature of these transactions at Athens.

Botzen, or BOZEN, a town of Austria, is situated at the junction of the Talfer and Eisach, and connected by roads with Switzerland, Germany, and Italy. It is thus the busiest town in the Austrian Tyrol, and manufactures leather, linen, silk, etc.

Boucher, FRANÇOIS, painter, was born in 1703 at Paris. He was painter to Louis XV. and was distinguished both for his landscapes and figures. Director of the French Academy, he died in 1770.

Boucher de Crevecœur de Perthes, JACQUES, anthropologist, was born in 1788 at Rethel in Ardennes. Napoleon, under whose notice he had been brought, sent him on various missions to Austria, Germany, Hungary, and Italy. He

wrote on various subjects, but his anthropological works only are of importance. He died in 1868 at Abbeville.

Bouches du Rhone (*i.e. Mouths of the Rhone*) is a French department, and was formerly a part of Provence. Its capital is Marseilles, and it is divided into the three arrondissements Marseilles, Aix, and Arles. Its chief river is the Rhone with its tributary the Durance. Among its industries are coal-mines, marble, limestone, and gypsum quarrying. Figs, olives, nuts, almonds, etc., are also successfully produced, and its salt-works are the largest in France. Among other of its products are wine, brandy, vinegar, etc.

Boucicault, DION, actor and dramatic writer, was born in 1822 at Dublin. He produced his first drama *London Assurance* in 1841, and its success diverted him from his intention of becoming an architect and induced him to adopt the stage. In 1853, having already produced the *Corsican Brothers* and many other pieces, he went to America, and on returning in 1860 to England brought out *The Colleen Bawn*. In 1862 he opened a Westminster theatre—a venture that proved unsuccessful. In 1875 appeared *The Shaughraun*, his most widely-known play. He wrote about 150 different pieces. He died in 1890.

Bouët-Willaumez, LOUIS EDOUARD, COMTE, a distinguished French naval officer, was born near Toulon on April 24th, 1808. In 1844, being then a captain, he was appointed Governor of Senegal, and in 1854 he was made rear-admiral and chief of the staff of the French fleet in the Black Sea. Five years later he commanded the squadron of blockade in the Adriatic. He became a vice-admiral in 1860, and a senator in 1865. On the outbreak of the war with Germany he was given command of the iron-clad fleet which was sent to the Baltic, where, however, he was able to effect little or nothing. He died on Sept. 8th, 1871. Admiral Bouët-Willaumez, besides being an exceptionally good naval officer, possessed great literary talent, and was the author of numerous books, pamphlets, and articles in technical periodicals.

Boufflers, LOUIS FRANÇOIS, DUKE DE, called also the Chevalier Boufflers, Marshal of France, was born in 1644. In 1662 he entered the army, serving under Condé, Turenne, and Catinat. In 1693 he was raised to the rank of marshal. His most famous exploits were the defence of Namur against William III. in 1695, and of Lille against Prince Eugène in 1708. His crowning achievement was at Malplaquet, where his skilful retreat was conducted without loss. He died in 1711.

Bougainville, LOUIS ANTOINE DE, the navigator, was born in Paris in 1729, and after having acted as Montcalm's adjutant at Quebec, set out in 1766 on a voyage round the world. This occupied him for two years and a half. After his return he commanded several line-of-battle ships in succession and was employed to assist the revolted North American colonies in their struggle against Great Britain. In 1780 he was made a field-marshal in the French army, but from that time forward he withdrew into retirement, and when he died in 1811 the world in general believed that he had already been dead for a quarter of a century. His great work, *Description d'un Voyage autour du Monde*, was published in 1772.

Bougainvillea, a genus of climbing plants, natives of South America, belonging to the order *Nyctaginaceæ*. Their inconspicuous tubular flowers are in groups of three, enclosed by three large submembranous tracts of a rosy-pink colour. The genus is named after the French circumnavigator, Louis Antoine de Bougainville (1729–1811).

Bough, SAMUEL, the artist, was born in 1822 at Carlisle. His father was a shoe-maker, and he himself received no regular art instruction. In 1845, however, he was employed in Manchester as a scene-painter, and subsequently at Glasgow, where Sir D. MacNee persuaded him to take up landscape painting. In 1856 he was made an associate of the Royal Scottish Academy, and in 1875 a full member. His chief works include *Canty Bay*, *The Rocket Cart*, *St. Monance*, *London from Shooter's Hill*, *Royal Volunteer Review*, which is in the Scottish National Gallery. He died in 1878 at Edinburgh, where he had been settled for twenty years.

Bougie, a fortified seaport on the Bay of Bougie, Algeria, is an important trading centre. It was the Salda of the Romans, the capital of Genseric, King of the Vandals, and under the Arabs enjoyed the distinction of being named "Little Mecca." The name "bougie," as applied to a wax candle, comes from this town.

Bougies are flexible cylindrical rods of suitable length and diameter employed in surgery for passing through abnormal constrictions produced by disease in certain mucous canals. They are usually either made of vulcanite or of a substance called gum elastic, and are especially employed in diseases of the urethra, rectum, and œsophagus. Medicated bougies are sometimes used for locally applying remedies to diseased mucous surfaces.

Bouguer, PIERRE, mathematician, was born in 1698 in Brittany. In 1729 he published *Essai d'Optique sur la Gradation de la Lumière*, showing the rate at which light is lost in passing through atmosphere. He was then made professor of hydrography at Havre, and succeeded Maupertius as associate geometer at the Academy of Sciences. In 1735 he accompanied Godin, La Condamine, and Jussieu to Peru to measure a degree of the meridian at the equator, and published an account of their labours in *Théorie de la Figure de la Terre*. He died in Paris in 1758.

Bouguereau, ADOLPHE GUILLAUME, painter, was born in 1825, at La Rochelle. After studying at the École des Beaux Arts, and working under Picot, he gained, in 1850, the *Grand Prix de Rome*, his subject being *Zénobie Trouvée sur les Bords de l'Araxe*. On returning from Rome, in 1855, he exhibited *Le Triomphe du Martyre*, showing the body of St. Cecilia being carried to the catacombs, a picture that was purchased by the State. His latest works, which illustrate the usual nature of

his themes, are *The Youth of Bacchus*, 1884; *The Adoration of the Magi*, 1885; *The Adoration of the Shepherds*, 1885. He also painted portraits, and did decorative work in the Hôtel Péreire, Paris, the Bordeaux theatre, and the churches of St. Augustine and St. Clotilde, Paris. He dien in 1905.

Bouillé, FRANÇOIS CLAUDE AMOUR, MARQUIS DE, French general, was born in 1739, at Cluzel castle, Auvergne. He signalised himself in the Seven Years' war, became governor of the island of Guadeloupe, and commander-in-chief of the French forces in the West Indies. He was nominated by Louis XVI. a member of the first Assembly of Notables, and in 1790 appointed to the command of the army of the Meuse, the Saar, and the Moselle. He did all he could to assist the escape of Louis XVI., and for this had to flee, entering the service of Gustavus III. of Sweden in 1791. He ultimately came to London, and published his *Memoirs of the French Revolution*, and died in 1800.

Bouillon, originally a German duchy, is now a district in Belgium in the Grand-duchy of Luxemburg. It belonged to Godfrey of Bouillon, the celebrated Crusader, who pledged it to the Bishop of Liege in order to raise funds for his crusade. It was united to Belgium in 1837. The capital of the district is also named Bouillon, and is situated on the Semoy, nine miles north-east of Sedan.

Bouilly, JEAN NICOLAS, dramatist, was born in 1763, at La Coudraye, near Tours. He was nicknamed the *poète lacrymal* from his excessive sentimentality. His chief works include *Pierre le Grand*, a comic opera, *L'Abbé de l'Epée*, *Les deux Journées*, etc. He died in 1842, at Paris.

Boulainvilliers, HENRI DE, Lord of St. Saire, writer. was born at St. Saire, Normandy, in 1658. He wrote numerous historical books, but all are marred by his class prejudice, and are now valueless. They include *History of Mahomet*, *History of the Arabians*, *History of the Peerage of France*, etc.

Boulak, a town of Lower Egypt, on the right bank of the Nile, is the port of Cairo, from which it is distant about one mile. Its industries embrace cotton, paper, and sugar; it has also the national museum of Egyptian antiquities.

Boulanger, GEORGE ERNEST JEAN MARIE, general, was born in 1837, at Rennes. After serving in Algeria, Italy, and China, he rose to the rank of colonel during the siege of Paris, general of brigade in 1880, and minister of war in 1886. He also became chief of the anti-German party, and after the fall of the Goblet ministry in 1887 was sent as commander of the 13th army corps at Clermont-Ferraud. In 1888 he was deprived of his command for remarks made on his successor at the war office. Resigning his seat, he was elected to the Chamber of Deputies for two departments, viz. the Nord and the Dordogne. His programme was, appeal to the people for revision of the constitution and abolition of the parliamentary system. He attracted all those who were in any way discontented with the existing régime, which in 1887 had received a severe shock from the "Wilson scandals" affecting President Grévy's son-in-law. In 1889 he again stood for three departments, the Nord, Somme, and Charente Inférieure, and for a division of Paris, and was elected in each case. Shortly afterwards, however, he was prosecuted for alleged misappropriation of public money while war minister, and, having fled the country, was condemned by default. He then had to seek refuge in England, and he afterwards lived in Jersey and Brussels. He committed suicide in 1891.

Boulay de la Meurthe, COUNT ANTOINE, statesman, was born in 1761, at Chaumonzey, in the Vosges. He adopted the side of the Revolution, and afterwards of Napoleon, and took an active part in preparing the *Code Civil*. He wrote an essay on *The Commonwealth in England*, and died in Paris, in 1840.

Boulder-clay, a clay containing boulders or fragments of various other rocks. Boulder-clays are of Pleistocene age, being either marine and stratified, in which case they, or the boulders they contain, are the result of floating ice, or terrestrial and unstratified, when they represent the ground-moraine of a glacier or ice-sheet. The boulders range in size from mere grit up to masses weighing many tons, the latter in Britain being more frequent in the north. From the abundance of pellets of a hard chalk, mainly derived from Lincolnshire, much of the boulder-clay of Suffolk, Essex, Hertfordshire, etc., is almost white and is known as the chalky boulder-clay. In Scotland boulder-clay is commonly known as *till*. Gravels and sands are commonly associated with the clay, sometimes as mere local patches lenticular in form, and sometimes more extensive. Derived fossils, often ice-scratched, occur in the clay, and flint-implements have apparently been found under some layers of it; but the attempts to subdivide it and to correlate its divisions chronologically have not as yet been successful. The clay is sometimes remarkably contorted, as at Cromer and Sudbury, and may enclose large detached masses of older formations, and this disturbed character frequently extends to the upper part of the underlying rocks, suggesting a ploughing action of ice driven over the surface with enormous force. Boulder-clay varies in thickness from 80 or 90 feet downwards, being generally thinner on mountain-slopes. It occurs extensively in Scotland, England, north of the Thames, Scandinavia, North Germany, Northern and Central Russia, and in the northern half of North America.

Boulevard (a French corruption of the German *bollwerk*, English *bulwark*), properly, the rampart of a fortified city. Part of the fortifications of Paris was removed in 1786, and the space converted into avenues flanked by two rows of trees. To these the term was applied, and it was afterwards extended to the similar streets (Boulevard des Capucines, des Italiens, etc.), formed under the Second Empire by Baron Haussmann, which are one of the most striking features of modern Paris. These of course are not on the sites of fortifications. They have been imitated in other French towns, in New York, and, to some extent, in London.

Boulogne-sur-Mer, a seaport on the north-west coast of France, lat. 50° 43′ N., long. 0° 43′ W., in the department Pas-de-Calais, head of arrondissement and of canton, situated at the mouth of the Liane which flows into the Straits of Dover. It presents three great points of interest: 1st, it is the great seat of the French North Sea fishing trade; 2nd, as being one of the principal ports of debarkation from England; 3rd, as having a deep and extensive outer harbour, constructed 1878–95, large enough to hold the whole French navy.

The town, built upon the right bank of the Liane, is divided into the Upper and Lower towns. The Upper town is the ancient fortified Boulogne, and is surrounded by ramparts, through which you enter by a fine old gateway into the Place Godefroi, where are the Hôtel de Ville, and the cathedral—modern—which, with its dome 300 feet high, contains a miraculous image of the Virgin. This image, according to tradition, arrived of its own accord in a boat at Boulogne, and has always been held in high veneration. The castle, built 1251, will be remembered as the prison of Louis Napoleon after the failure of his noted Boulogne expedition, in 1840. The ramparts have been planted with trees and form a pleasant promenade around the Upper town.

The Lower town contains the picturesque but somewhat dirty fishing-quarters, and the many hotels and shops which have grown out of the cross-channel traffic, and the great colony of English, who, for divers reasons—more in former times than now—wished to be out of England, and found Boulogne a pleasant spot, and one not too remote from their own shores. The fishing population form a striking feature in the daily life of Boulogne, and few can visit the town without admiring the springy walk and the quaint caps of the fishwives. One should not omit to visit the open market, by St. Nicholas' church, in the steep Grand' Rue which leads up to the ramparts, or the neighbouring village of Portalois, with its distinct populace, who retain their own peculiar costume.

Three bridges over the Liane join Boulogne to its suburb of Capécure, where are the railway works and most of the factories. These are chiefly pottery, glass and tile works, salt and sugar refineries, spinning mills, steel pen factories, cement works, smelting furnaces, and iron foundries. Its commerce, especially with England, has been rapidly developed of late years. Steamers ply daily between Boulogne and London, the passage taking between nine and ten hours, and twice a day to Folkestone, the passage occupying but two hours.

The sands of Boulogne make a pleasant bathing-ground and lounge; and of late a doctor has put them to a new use, by bringing scrofulous and rachitic children to the sands, and making them take a daily sand-bath (so to speak) in the sun. This has brought about some wonderful cures—whether they be the effect of the sand, or the sun, or the air, or all together. The Tintelleries make a pretty garden and recreation ground, and it is a pleasant walk out over the cliff to the Napoleon Column, erected partly to commemorate the first distribution (1804) of the cross of the Legion of Honour by Napoleon, and partly to commemorate the celebrated camp which was pitched on this spot when Napoleon formed the project of invading England by means of a flotilla of flat-bottomed boats. Boulogne is said to have been founded by Caligula, who built a lighthouse at Bononia. After different changes, it belonged, in 1435, to the Duke of Burgundy, and became a French possession in 1477, under Louis XI. It was taken by Henry VIII. in 1544, but was restored to France in 1550. Godfrey de Bouillon was Count of Boulogne. The underground parts of the castle are of great archæological interest. Pop. (1901), 49,083.

Boulogne-sur-Seine, a town of France, in the Seine department, arrondissement of St. Denis, on the right bank of the Seine, and about five miles from Paris. It lies between the Seine and the well-known wood called the Bois de Boulogne, and is opposite St. Cloud. It is not without some connection with Boulogne-sur-Mer, since, in 1319, Philippe V. gave leave to Parisians and others who had made the pilgrimage to Boulogne-sur-Mer, to build a church at the village of Menus, by St. Cloud, and this church, becoming also the object of a pilgrimage, soon gave a new importance to the village. The Bois de Boulogne—called also the Forest of Bouvray, and, in old times, the Wood of St. Cloud—is between Boulogne and Paris, and has been from time almost immemorial, and still is, one of the chief pleasure places around Paris. A visit to Paris would be incomplete without a drive in the Bois; and it is in some measure to Paris what Rotten Row is to London, save that it is more democratic and considerably more varied in its pleasures. It is now a gigantic park, with water, wood, lawns, fountains, avenues, and broad walks, having been made over to the city of Paris in 1853. There was a royal castle here, said to have been built by Francis I., in remembrance of the castle where Charles V. kept him prisoner; and the Bois was one of the scenes of the extravagant pleasures of the court and noblesse down to the Revolution, when it became equally the resort of the dandies of the First Republic, and is still the necessity of life to fashionable Paris under the Third Republic. The wood suffered in 1815, when part of the army of occupation was encamped there, and military necessities played havoc with it during the siege of Paris in the late Franco-German war of 1870. It would not be right to quit the subject of Boulogne-sur-Seine without a word of tribute to the many laundresses for whom the town is famous. Pop. (1901), 47,168.

Boulton, MATTHEW, English engineer and manufacturer (1728–1809). Born at Birmingham, he succeeded to his father's important business, as stamper and worker in metal, and having discovered a new method of inlaying steel, he founded his afterwards famous factory at Soho, near Birmingham. Seven years afterwards he began to use steam, and went into partnership with James Watt. The two together made many improvements in engine-building, and they applied steam to the working of an engine for striking medals

and coining money. Very soon they were employed in minting silver and copper for the East India Company, for Sierra Leone, and others, and their principle was adopted at the Tower Mint. Boulton had also an important foundry at Smethwick for making the different parts of steam-engines. Paul I., of Russia, commissioned him to supply St. Petersburg with all apparatus necessary for two minting-houses. In 1773 he discovered a method of mechanically engraving two-coloured pictures. He was a member of the Royal Societies of London and Edinburgh, and did much, both by his own efforts and discoveries, and by his generous patronage, to advance mechanical knowledge and practice.

Boundary, in *Geometry*, means the geometrical entity that separates any other geometrical entity from its surroundings. The four geometrical entities usually dealt with are solids, surfaces, lines, and points. A solid is bounded by surfaces, a surface by lines, and a line by points. If the surfaces bounding a solid be given, the solid is completely determined. But given the close curve bounding a surface, we may obtain an infinite number of other surfaces with the same boundary. So also an infinite number of different lines may be bounded by the same two points. [GEOMETRY.]

Bounding Charter. A term used in the Law of Scotland for indicating lands by their boundaries. A bounding charter passes the right to everything within the bounds therein set forth (hence the term), but it does not permit the acquisition of anything outside such bounds. If the subject matter of the charter be bounded by walls, these do not, generally speaking, pass by the grant, and where a wall is intended for mutual use, this should be expressed. The boundaries described determines the extent of the grant, though its measurement may exceed the quantity stated in the grant.

Bounds, BEATING THE, an old English custom, which has parallels in other countries. Usually at Whitsuntide the clergy, churchwardens, and boys of the parish school used to perambulate the boundaries of the parish, the boys striking the boundary line from time to time with willow wands. Sometimes the boys were whipped at important points, to fix the subjects in their minds. The custom lasted in some places far into the 19th century.

Bounty. 1. A sum given by a government, either directly or in the form of a remission of taxation, to encourage some branch of manufacture or production among its inhabitants. Such bounties were common in Adam Smith's time, and the "sugar bounties," abolished 1903 (which were a return of the tax paid on all such sugar as was exported), given by France, Germany, and other foreign nations for the manufacture of beetroot sugar, are a familiar modern instance. The main economic objection to them is that they draw part of the capital of the country into a business which is not naturally profitable enough to attract it, but which is made attractive at the expense of the tax-payer. Thus the aggregate national capital does not increase so fast as it would were it left alone; and the greater the national capital the more employment for labour. Thus the bounty eventually defeats its own object.

2. The sum of money paid to recruits on entering the service. In war time, in England and America, this has often been large. In the great French war it was sometimes upwards of £20.

3. The Royal Bounty is (*a*) an annual grant of £2,000 to the Church of Scotland, (*b*) the sum given in England for encouraging the breed of horses, hitherto usually expended in Queen's Plates. The King's Bounty is the sum, usually of £1 per child, given by His Majesty to poor women who have three or more children at a birth.

Bouquetin, the French popular name of the Ibex (q.v.), occasionally used in English literature.

Bourbaki, CHARLES DENIS SOTER, French general, born at Paris 1816, of a Greek family. He entered the French army as sub-lieutenant of Zouaves in 1836, and went through the different steps to the rank of general-of-division, which he obtained in 1857. He took part in the Crimean war, and distinguished himself at Alma, Inkermann, and the taking of Sebastopol, and was also in the Italian campaign of 1859. He commanded the Imperial Guard at Metz in 1870, and afterwards under the Dictator Gambetta he commanded the army of the Loire. He failed to break through the Prussian line at Belfort, and met with other serious reverses, and his army, after much suffering, was forced to cross the Swiss frontier near Pontarlier. He then attempted suicide, in despair. After commanding an army corps at Lyons for a few years, he retired in 1881.

Bourbon, a French family name, which became that of the royal houses of France, of Spain, and of Naples and the Sicilies, besides having several collateral branches. When the Constable Charles de Bourbon was disinherited and died (*see below*) his possessions fell to a younger branch of the family, and so finally to Antoine (1537–1562), who by his marriage with Jeanne d'Albret became King of Navarre. Of this marriage were born Catherine de Bourbon and Henri de Bourbon, who, as Henry IV., became King of France, and the founder of the French royal house of Bourbon. It is impossible, in a limited space, to give more than the barest outline of each of the chief branches:—

French Bourbons. 1. HENRI IV. (1589–1610). 2. LOUIS XIII. [his 2nd son, Philippe d'Orléans, was founder of the Orléans branch] (1610–1643). 3. LOUIS XIV. (1643–1715) [his grandson, Philippe d'Anjou, was founder of the Spanish branch]. 4. LOUIS XV. (1715–1774), grandson of Louis XIV. 5. LOUIS XVI. (1774–1793), grandson of Louis XV., beheaded. 6. LOUIS XVII. (1785–1795), did not reign, died in the Temple (prison). 7. LOUIS XVIII. (1814–1824), brother of Louis XVI. 8. CHARLES X. (1824–1830), brother of Louis XVI. 9. HENRI, Duke of Bordeaux, Count of Chambord, born 1820, never reigned, and died childless, 1883, thus ending the eldest branch of the French Bourbons.

Orléans Branch. 1. PHILIPPE, Duke of Orléans, died 1701. 2. PHILIPPE, regent, died 1723. 3. LOUIS, died 1752. 4. LOUIS-PHILIPPE, died 1785. 5. LOUIS PHILIPPE (Égalité), beheaded 1793. 6. LOUIS PHILIPPE, king 1830–1848, died in exile 1850. Louis Philippe left four sons, who, or their descendants, now represent the legitimate branch of the French royal house.

Spanish Bourbons. This branch has hardly played a sufficient part in European politics to call for much notice. It begins with Philippe of Anjou, second grandson of Louis XIV., who was called to the Spanish throne by the will of Charles II., King of Spain, and was crowned as Philippe IV. 1. PHILIPPE V. (1700–1746). 2. FERDINAND VI. (1746–1759), died childless. 3. CHARLES III. (1759–1788), son of Philippe V. 4. CHARLES IV. (1788—resigned his rights in 1808 to Napoleon I.). 5. FERDINAND VII. (1814–1832), died without sons. 6. ISABELLE II. (1833, deposed in 1868); her right was disputed by her uncle Don Carlos, younger son of Charles IV. 7. ALFONSO XII. (1874–1885). 8. ALFONSO XIII. (posthumous, 1886).

The Neapolitan branch began with Charles III. (a son of Philippe of Anjou, King of Spain) 1738, and ended with Francis II. (great-great-grandson of Charles III.), who was expelled in 1860, and the kingdom came to an end.

Bourbon, CHARLES, DUKE OF, commonly called the Constable de Bourbon, Count of Montpensier and la Marche, warrior and adventurer (1490-1527). By birth the second son of the Count of Montpensier, he became possessed, first by the death of his eldest brother, and second by a marriage with his cousin, Suzanne de Bourbon, of the immense property of the Bourbons, including, among other parts, Bourbonnais, half of Auvergne, la Marche, and Beaujolais. Beginning his life of a soldier as the companion in arms of Bayard, he lived to receive Bayard's dying reproaches for having deserted his country. It was his courage and coolness that chiefly contributed the victory of Agnadel (1513) and saved Burgundy from the Swiss. For this victory Francis I. made him Constable. In 1515 his almost mad courage gained for him the governorship of Milan and Lombardy. Soon after, for some cause or other, whether, as some say, for being a rival in love of the king, or whether, as others say, for disdaining the love of Louise of Savoy (the queen-mother) he fell into disfavour, and the king heaped many slights upon him. Things went from bad to worse, till at last, when Louise of Savoy laid claim to the possession of the Bourbons, he began to intrigue with Charles V., asking in marriage the hand of Eleanor, the Emperor's sister, and offering his aid in the invasion of France. His treachery was discovered, and in 1523, instead of arriving in Germany as an important general, he reached it as a fugitive. The Emperor, however, gave him the post of lieutenant-general, and sent him to Italy, where he defeated and drove out the French under Bonnivet. It was at this point that he received the reproaches of the dying Bayard. He went on his course, and had a great share in the victory of Pavia—so disastrous to Francis I. (*see* BOULOGNE-SUR-SEINE), and then, perhaps thinking himself neglected, started a war on his own account in Italy, in order to make himself King of Milan. Played with on all sides—by the Spanish, by the Emperor, by Francis I.—he became desperate, and getting together an army of free-lances—such as we read of in Bulwer Lytton's Rienzi — he attacked Rome and was mortally wounded, it is said by Benvenuto Cellini, in the assault. His comrades buried him at Gaeta. An edict of parliament at Paris branded his memory, ordered his possessions to be forfeited, and his house to be painted yellow—the traitor's colour. Charles V. had gratitude enough to insist, in the treaty of Cambrai, on a part of this sentence being remitted.

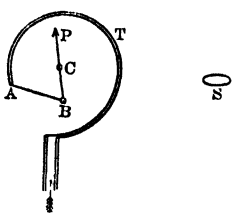
Bourbonnais, an ancient province of France, once the duchy of Bourbon, belonging to the departments of the Allier, Puy-de-Dôme, the Creuse, and the Cher, and lying to the north of Auvergne. The Loire bounds it on the east, and the Cher on the west, and the Allier cuts it into two unequal parts, called respectively Upper and Lower Bourbonnais. Its capital is Moulins, and among its great towns are Gannat, Montbichon, and Vichy. Bourbonnais produces wine, grains, hemp, and fruit; and has iron and copper mines, and coal pits, and also marble quarries. Its mineral waters are abundant and renowned.

Bourdaloue, LOUIS (1632–1704), born at Bourges, died at Paris, great French preacher. Becoming a Jesuit novice at sixteen years old, he finished his course, and preached for some years in the provinces. He was called to Paris in 1670, when Bossuet was at the height of his fame. He succeeded Bossuet, whose other duties made him preach less often, and if he did not surpass Bossuet he suffered no loss by comparison with him. Madame de Sévigné was charmed with his preaching, and he was sent for to preach at Court ten times, whereas a preacher hardly ever appeared there more than three times. Perhaps the greatest compliment to his talents was the exclamation of Marshal de Grammont—"By God, he is right!" Fénélon, strangely enough, condemns him pretty severely as an orator. Voltaire puts him alongside Pascal, the great opponent of the Jesuits. He has been called "king of preachers, and preacher of kings." His pure morals and virtuous life did much to counteract Pascal's accusations against the Order. Bourdaloue died with calmness and resignation, in full harness, at the age of seventy-two. Among his best sermons are those on *The Conception*, *The Last Judgment*, and *The Forgiveness of Injuries;* and his masterpiece is thought to be that on *The Passion*, in which he shows that the death of Christ is the triumph of His power.

Bourdon de l'Oise, FRANÇOIS LOUIS (born about 1750, died 1797), a French revolutionist, and member of the Convention. He was born, near Compiègne, of a family of farmers, and having read for the bar, became an agent to the parliament of Paris. He threw himself with enthusiasm into the revolutionary cause, joined in the attack on the

Tuileries, and was sent to the Convention by the department of the Oise, whose name he adopted. He voted for the death, without respite or appeal, of the king, and had a share in the fall of the Girondins. Shortly afterwards he fell out with Robespierre, who had him excluded from the Jacobins. From this moment he became more and more anti-revolutionist, and, as a member of the Council of Five Hundred, gave such offence to those in power that he was banished by the Directory to Guiana, where he soon died. He was accused of having made a fortune by trafficking in assignats and national property.

Bourdon Gauge, an instrument for measuring gaseous or liquid pressure, very extensively adopted in mechanical engineering. If a bent tube be closed at one end, and then be subjected to internal fluid pressure applied at the other end, greater than that of the atmosphere outside, the tube will tend to straighten itself. An opposite effect manifests itself when the internal pressure is reduced below that of the atmosphere. If one end of the tube be fixed, the motion of the other end may be made to record the difference between external and internal pressures. This is the principle of the Bourdon gauge, a sketch of whose working parts is here given. T A is the bent tube, shown in section at S. It opens at T into the boiler, condenser, or other vessel where the pressure is to be estimated. B is the closed end of the tube. Its motion is made to turn the needle B P, pivoted at C, by means of the small link A B. The motion may be more neatly magnified by means of spur-gearing.



BOURDON GAUGE.

Bourgelat, CLAUDE (1712–1779), founder of veterinary surgery in France. Born at Lyons, he became a barrister, quitted the bar for the army, where he became one of the first horsemen in Europe. Always fond of horses, and seeing that there was no method in farriery as then practised, he entered on a course of comparative anatomy, and with a view to the better understanding of animals he made himself thoroughly acquainted with the human subject. The first veterinary school was opened in 1762 at Lyons, and attracted students from all Europe. The government made him inspector-general of all veterinary schools, and in 1765 he founded the school of Alfort. He was not only a thoroughly scientific man, but also an elegant and voluminous writer. He corresponded with many European celebrities, and there are extant two very interesting letters from Voltaire to him, touching chiefly on diseases of animals. Frederick the Great wrote to ask his opinion whether the gallop or the trot is the better pace for a cavalry charge. Bourgelat decided in favour of the trot.

Bourg-en-Bresse, a town of France, in the department of Ain, chief town of department, arrondissement, and canton, on the left bank of the Reyssouse, thirty-seven miles north-east of Lyons, and about 200 miles south-east of Paris. The town is well-built and laid out, and has a fine church, in which are monuments to General Joubert and to Bichat the great anatomist. Lalande, the astronomer, was born here, as was also Michaud, the historian. Outside the walls is the fine Gothic church of our Lady of Brou. There are here manufactories of earthenware, pottery, and jewels; and a trade in corn, wine, horses, cattle, and the famous poultry of the place.

Bourgeois Type. [PRINTING.]

Bourgeoisie (German *burg*, town), in France of the 18th century, the professional and mercantile, and shop-keeping classes, as contrasted with the nobles and the peasantry. The term is now used by socialist writers specially for the capitalist and middle class as contrasted with artisans and labourers. Selfishness and narrowness are attributed by them to the "bourgeois spirit."

Bourges, French town, department of Cher, head of department, arrondissement, and canton, at the junction of the Auron and Yèvre, about 150 miles south of Paris. It is a town of considerable military importance, and contains an arsenal and cannon foundry. There are cloth and blanket factories, cutlery works, and nursery gardens, and there is a good trade in hemp, wine, wool and agricultural produce. The noble cathedral of St. Stephen is a fine specimen of thirteenth-century architecture. The Town Hall was the house of the famous Jacques Cœur, Charles VII.'s treasurer, and is a fine example of the domestic architecture of the fifteenth century. There are other good Renaissance houses. Bourges was the birthplace of Louis XI., and of Bourdaloue. Under the Roman occupation Bourges was called *Avaricum*, from *Avara*, the Italian name of the Yèvre. Cæsar, in his *Commentaries*, says it was one of the finest cities of the Gauls. It afterwards became the capital of Berry, and as such underwent many sieges. Charles VII. found a refuge here at the beginning of his reign, and was in consequence called the King of Bourges. The university founded at Bourges in 1463 by Louis XI. had a great reputation, and among its professors was the famous lawyer Cujas.

Bourget, ERNEST, French dramatic author, died 1864. His pieces, the chief of which is perhaps *Le Sire de Franc-Boisy*, have been extensively played at the Porte-Saint-Martin, the Bouffes-Parisiens, and other like theatres. He was one of the authors of *Chansons Populaires de France*.

Bourget, PAUL, French novelist and essayist, born at Amiens 1852. His novels are of the modern school of psychological analysis and insearch, and are written in a clear and pleasing style. He is said to take peculiar pains in revising and polishing what he writes. His *Nouveaux Essais de Psychologie contemporaine* are of much interest, and his novels, *Un Crime d'Amour* and *Mensonges*, are favourites with some.

Bourgueticrinidæ, a family of Crinoidea or sea lilies, of which the type-genus *Bourgueticrinus* is a common fossil in the English chalk.

Bourignon, ANTOINETTE (1616–1680), a religious visionary, who seems in part to have anticipated Joanna Southcote, and in part the Salvation Army. Her extravagant ideas and utterances caused her to be driven from Flanders, Brabant, Holland, Holstein, and Alsace, and she finally died in Friesland. Among other curious speculations in which she indulged, was the nature of Antichrist, as to whose birth and appearance she was fully informed, even to his complexion and the colour of his hair. She also had a vision as to how Adam was shaped and formed before his fall. Her works were published at Amsterdam (1679–1684), in 21 volumes, and some of the least entertaining have been translated into English.

Bourmont, LOUIS AUGUSTE VICTOR, COMTE DE GHAISNES DE (1773–1846), Marshal of France. Born at the castle of Bourmont, he was an officer of the French guards at the time of the revolution. He fought in the army of Condé, and with the royalists till the failure of the cause. For some time he remained in hiding at Paris, but is suspected of having done so with the connivance of the authorities, and to have played a double part. However that may be, he was imprisoned after the attempt to assassinate Napoleon. He escaped to Portugal, and was at Lisbon when Junot took it in 1810. He came back to France, and was made colonel by Napoleon. His courage and talent shown in the different campaigns advanced him to the rank of general of division. At Napoleon's downfall he became one of Louis XVIII.'s generals, and, sent with Ney to bar Napoleon's advance during the Hundred Days, he again took a command under the Emperor, who appointed him against Carnot's advice, who distrusted Bourmont. This distrust seems to have been justified, for Bourmont soon deserted to Louis XVIII., who was at Ghent. At the restoration he received a command, fought in Spain in 1823, and in 1829 he became minister for war. In 1830 he commanded the army that conquered Algiers, and was made Marshal of France. At the revolution of July he refused allegiance to Louis Philippe, and was driven from the army. After trying in vain to raise a counter-revolution, he went to Portugal, and made an unfortunate campaign there for Don Miguel. He tried vainly to return to France in 1840, did return later, and finally died at his birthplace.

Bourne, HAILBOURNE, or WINTERBOURNE, an intermittent spring or stream, occurring commonly in chalk districts after an exceptionally wet season. They owe their origin to a general rise of water underground throughout the area, flowing out at all points where the level of the surface of the ground is lower than the level to which the underground water rises (*saturation-plane*). They therefore often flow along those "dry valleys" of our chalk downs which were probably permanent watercourses in a more pluvial period. They rise at Hemel Hempstead and Henley in the Chiltern Hills, at Croydon, Caterham, Mersham and Epsom in the North Downs, at Ashcombe near Lewes, and at Lavant in the South Downs, and also in Wiltshire and Dorsetshire. From the time of Werkworth in the 15th century, and the credulous John Aubrey in the 17th, to our own time, the outbreak of these bournes has been popularly supposed to foreshadow national misfortune.

Bourne, HUGH (1772–1852), founder of the sect of Primitive Methodists. He was a Wesleyan, but as his habit of open-air preaching and meeting did not meet with the approval of that body, he separated from them, or was cut off by them, and in 1810 founded the first community of Primitive Methodists. Although following his occupation of carpenter and builder, he found time to spread his principles in the British Isles and the United States. He seems to have led an exemplary life, and he was much esteemed by his sect.

Bourne, VINCENT (1695–1747), was educated at Westminster, and after graduating at Trinity College, Cambridge, and getting a fellowship there, he went back to Westminster as a master, where he gained much renown as a Latin versifier, writing some good original poems, and making happy Latin translations of English ballads. Cowper admired him, and translated some of his poems, and Lamb speaks genially and prettily of him.

Bournemouth, a watering-place of Hampshire. It is noted for its sands, for its air, which, while not relaxing, is soft and agreeable to most invalids, for the beautiful scenery of the neighbourhood and the pine-covered valley in which it lies. It has two piers, an aquarium, winter garden, town hall, sanatorium, and several hospitals. Godwin, Mary Wollstonecraft, and Mary Shelley are buried in the churchyard of St. Peter's, Bournemouth. Pop. (1901), 47,003.

Bouroudjird, a Persian town, in the province of Irak-Adjemy, and capital of the government of the same name, on the road from Hamadan to Ispahan, and about 170 miles N.W. of the latter. It is well situated in a fertile plain, and watered by a river bordered by great trees. The town has a manufacture of coarse cotton goods, and the land around is well cultivated. Saffron is grown; there are mulberry trees for the silkworms, and cotton, maize, sugar-cane, and potatoes are cultivated.

Bourrienne, LOUIS ANTOINE FAUVELET (1769–1834), fellow-student and secretary of Napoleon. He was at Brienne with Napoleon, and having followed diplomacy, he went to Italy with Napoleon and became his private secretary, and with Clarke drew up the treaty of Campo-Basso. He also went to Egypt with Napoleon, and stayed with him till 1802, when, becoming implicated in the questionable bankruptcy of a contractor, he was removed and sent as *chargé d'affaires* to Hamburg, where in 1813 he was again mixed up in questionable speculations. He afterwards joined Louis-Philippe, and became a minister of State and deputy of the Yonne. The revolution of July drove him mad, and in this state he died. He wrote some memoirs in which he spoke very plainly of Napoleon, but his statements are not much trusted, and to correct them the Count of Aure wrote (1830) *Bourrienne et ses Erreurs volontaires et involontaires.*

Boussa, town of Central Africa, capital of kingdom of same name, on an island of the Quarra or Niger, lat. 10° 14′ N. It is a fortified place, and the residence of the sovereign. Mungo Park was killed here as he was going up the Niger.

Bouterwek, FREDERIC (1766–1828), German philosopher and poet. The disciple first of Kant, then of Jacobi, he was more distinguished for his skill in setting forth their doctrines than for any originality of his own. He did much for criticism and for literary history, and his *History of Poetry and Eloquence among Modern Races* is of some reputation. His poetry is of little merit. He was councillor of the duchy of Weimar, and professor of philosophy at Göttingen.

Bouts Rimés (Fr. *rhymed ends*), a French literary pastime. Each player is supplied with four or more words, each two of which are similar in sound. These are supposed to be the endings of four lines of poetry, which he has to complete. The game is referred to in Addison's *Spectator*.

Bouvardia, a genus of plants of the order Rubriaceæ, with bright scarlet flowers; it is much used for borders.

Bouvines, a French village, North department, arrondissement of Lille, from which it is distant 8 miles. It is of no importance, except historically as having been the scene of Philippe Auguste's victory over the Emperor Otho IV., in 1214.

Bovate, or OX-GANG, was one-eighth of a carucate (q.v.). It was an old English measure of land, as much as an ox can plough in a season—from 8 to 18 acres, or more, according to the district.

Bovidæ, a family of even-toed ruminants, here used as the equivalent of *Cavicornia* or Hollow-Horned Ruminants. The term Bovidæ has had various definitions, but in this sense embraces oxen, bisons, buffaloes, antelopes, sheep and goats, though these animals have been classed in three, and sometimes in as many as five different families. Many of the members of this group are widely dissimilar in external appearance, but the annectant forms are so numerous, and grade into each other by such imperceptible degrees, that it was found impracticable to frame satisfactory definitions for the smaller groups adopted by some naturalists. For this reason the larger definition of the family is the more general one, the antelopes, oxen, sheep and goats being considered as groups, each of which has too much in common with the others to be entitled to the rank of a family. In the Bovidæ are included the typical ruminants, and those of most service to man for food, for beasts of burden and for the commercial importance of their skins, bones, horns, etc. There are six molar teeth on each side in each jaw; six incisors and two canines in the lower jaw, separated by a wide interval from the molars, and in the forepart of the upper jaw there is a horny pad, against which the incisors and canines of the lower jaw bite. The frontal appendages differ widely from those of the deer [ANTLERS], and consist of horn-cores (processes of the frontal bone), covered with a sheath of horn, never shed except by the American Prong-horn (q.v.). Generally speaking, horns are present in both sexes, sometimes, however, only in the males. The feet are cleft, and there are generally accessory hoofs. The family is chiefly confined to the Old World, only a few forms being found in America. For the taurine, bisontine, and bubaline forms of typical genus Bos and its allies, *see* CATTLE, OXEN, BISON, BUFFALO; *see also* ANTELOPE, GOAT, MUSK-OX, SHEEP.

Bow, the more or less rounded fore-end of a ship or boat, which cuts the water. The "starboard bow" and "port bow" are respectively on the right and left hand side of the stem of the ship (q.v.).

Bow, an instrument for projecting an arrow. It is usually made of a piece of wood, whose ends are connected by string. [ARCHERY.] The term is also applied to the instrument which is used to set the strings of a violin, or the like, in vibration.

Bowdich, THOMAS EDWARD (1790–1824), English traveller in Africa. Born at Bristol, in 1814 he went to see a relative—Hope Smith—governor of the Cape Coast, who charged him in 1816 with a mission to Guinea, to establish commercial relations. He penetrated as far as Coomassie, and succeeded in his mission. He then returned to Europe, and went to Paris for the purpose of scientific study. In 1822 he with his wife undertook a new journey to Africa, and explored the mouth of the Gambia. Here he died of malignant fever. He wrote several works. His *Embassy to the Country of the Ashantis* gave Europe its first knowledge of that country. Among other things he wrote a treatise on finding the longitude at sea by observation of lunar eclipses.

Bowditch, NATHANIEL, American astronomer (1773–1838). Born at Salem, in Massachusetts, and practising first the trade of a cooper and then that of ship's chandler, he showed great aptitude for mathematics. He studied hard at the science, and made several voyages with a view to checking his theories by practical knowledge. He declined the offers of different professorships, and became the actuary of an insurance company. He was afterwards president of the Boston Academy of Sciences and Arts, and a member of the corporation of Harvard College. His best known works are the *American Practical Navigator*, and a translation of Laplace's *Mécanique Céleste*.

Bowdler, THOMAS (1754–1825), an English editor of Shakespeare and Gibbon, whose chief claim to note arises from the fact that his name—like that of Captain Boycott—has given the English language a new word. He made it his special province to look after the morals of his neighbours, and to this end issued an expurgated edition of Shakespeare; and in the latter part of his life he prepared a similar edition of Gibbon, from which all passages that he considered of an immoral or irreligious tendency were omitted. He was undoubtedly a well-meaning man; luckily his editions are not cheap, so people can let them alone.

Bowdoin, JAMES (1727–1797), son of a French merchant forced into exile by the edict of Nantes. Born in Boston, he was elected to the continental

Congress in 1774, and the next year he was Governor of Massachusetts. He did much by speech and writing to advance the cause of American Independence, and when compelled by ill-health to resign his public functions, he gave himself up to science and literature. He was president of the Philadelphia Academy of Sciences and Arts, and fellow of the Royal Societies of London and Edinburgh. Bowdoin College, in the state of Maine, is named after him.

Bowels. [INTESTINES, INFLAMMATION, etc.]

Bowen, RICHARD, a very gallant naval commander, was born at Ilfracombe in 1761, and at the age of thirteen entered the merchant service; but in 1778 he volunteered into the royal navy, and soon afterwards attracted the notice of Captain Jervis, who subsequently became Lord St. Vincent. He distinguished himself in Vice-Admiral Darby's action on July 29th, 1781, and on April 21st, 1782, at the capture of the *Pégase*, 74. For the latter service he was made an acting lieutenant; but he did not succeed in obtaining his actual commission until 1790. In the next year he commanded with great credit a division of transports which went to the relief of the colony in New South Wales, and returning in 1793, received the thanks of the Navy Board and of the Colonial Secretary. In 1794, as one of the lieutenants of the *Boyne*, 98, he again distinguished himself at the attack on Martinique, and especially in the capture, by boarding, of the large French frigate *Bienvenue*. This gained him his immediate promotion to the rank of commander, and he was very shortly afterwards posted. Having been given command of the *Terpsichore*, 32, he was so fortunate as to be able to save the *Dædalus* from capture by the French in the Chesapeake. At the evacuation of Fort Matilda, Guadaloupe, he was severely wounded in the face; but he refused to quit his command, and in 1795 and 1796 he rendered good service in the Mediterranean. On October 13th, in the latter year, off Carthagena, he met and engaged the Spanish frigate *Mahonesa*, 32, a much larger and better manned vessel than his own; and after an hour and forty minutes' action he took her. He also took a large Spanish treasure-ship, and on December 13th, 1796, engaged and captured the *Vestale*, 36, after one of the most spirited actions on record. Three months later, having sighted the dismasted *Santissima Trinidad*, 130, which had been badly mauled at St. Vincent, he bravely attacked her, but, of course, without success. On the 24th of July following this devoted officer was killed by a grape-shot, at the storming of Santa Cruz, at the moment when Nelson received his wound. His elder brother, James, was master of the *Queen Charlotte* in the action of the glorious First of June, 1794; his second brother, George, became a post-captain in 1802; his youngest brother, Thomas, died as a midshipman of the *Cumberland* in 1790.

Bower, WALTER, called also BOWMAKER (1385–1449), Scottish historian. Little is known of his life, except that he was Abbot of St. Columba's, Inchcolm, in the Firth of Forth. He continued the history of Scotland—carried by Fordun down to the death of David (1153)—as far as the death of James I. (1437). As he was speaking of events contemporary or almost so, his work is entitled to credit. Like Fordun, he wrote in Latin, and the *Scotichronicon* has not been translated.

Bower-bird, a name for any species or individual of a group of Thrush-like birds from Australia and the Eastern Archipelago, due to the fact that the majority of them erect bower-like structures of twigs, in which they disport, and in which the males display their love-antics. There are five genera—Sericulus, Ptilonorhynchus, and Chlamydodera, confined to Eastern Australia, Æluredus (called also Cat-birds from their cry), ranging thence to the Papuan Islands, and Amblyornis, confined to New Guinea; they were formerly made a sub-family (Tectonarchinæ) of the Paradiseidæ, but are now generally placed with the Babbling Thrushes (q.v.). The plumage of *Sericulus chrysocephalus* (the Regent Bird) is brilliant golden-yellow and black; that of the male of *Ptilonorhynchus holosericeus* is glossy black, and of the female brown and green mixed; the species of Chlamydodera are clothed in brown, more or less spotted with buff, and generally have a nuchal crest; the Cat-bird (*Æluredus smithii*), is green, spotted with white, the ground-tint lighter on the under-surface; in the other two species of the genus the upper-surface is green, and the under-surface yellow or buff, spotted with brown. The single species of Amblyornis, from New Guinea, is rufous-brown above, buff beneath. The bower-building habit seems to be confined to the first three genera, and it must be borne in mind that these bowers are in no sense nests. Of the nidification of these birds little is known; the nest and eggs of *Æluredus smithii* have only recently been found. The bowers made by the various species differ somewhat in their form and ornamentation, but the general principle of construction is the same. They are decorated with gay feathers, shells, bleached bones, bright-coloured berries, and, in some cases, tall grasses, "the whole showing a decided taste for the beautiful," and the bones and shells are often arranged so as to form a kind of pathway to the bowers, which are the most wonderful instances of bird-architecture yet discovered.

Bowie Knife, a heavy knife with a long curved blade, familiar in literature dealing with the Western United States; named from its inventor, Colonel Jim Bowie, who was killed in the war of liberation of Texas from Mexico, in 1836.

Bowles, WILLIAM LESLIE (or LISLE) (1762–1850), English poet. Born at King's Sutton, Northamptonshire, where his father was vicar, he went to Winchester College, and then to Trinity College, Oxford, and afterwards became prebendary of Salisbury, and rector of Bremhill, Wiltshire. He is perhaps less known for his own poetry than for his influence in forming the Lake School, and has been even more neglected than they now are. He inaugurated the poetry of nature; and his criticism of Pope, in an edition he brought out in 1807, gave rise to a controversy with Byron and Campbell, in which Bowles did not come off worst.

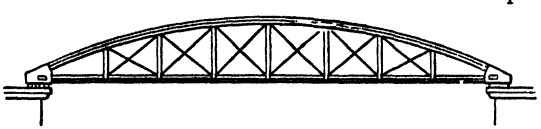
Bowls, an English game of some antiquity, still largely practised. A smooth level piece of turf about 40 yards square, surrounded by a shallow trench, is needed. Each player has two bowls, which he rolls so that they may lie as near as possible to a small white ball (the "jack"), which is first of all rolled to a distance of not less than 20 yards from the players. Each bowl is *biassed*, so that some skill is required to excel in the game.

Bowring, SIR JOHN (1792–1872), the first editor of the *Westminster Review*, was distinguished both in literature and politics. He was a member of Parliament from 1835–1849, when he was made consul at Hong-Kong, while in 1853 he was appointed governor. In 1856 he ordered the bombardment of Canton, as a consequence of an insult to the British flag; a proceeding which roused much opposition at home. He retired in 1859.

Bowsprit, a large boom or inclined mast projecting over the stem of a ship, to carry sail forward, and to support the foremast by confining the stays wherewith it is secured. The bowsprit is rounded, except at the outer end, and, in large vessels, is generally placed at an angle of about thirty-six degrees with the horizon. It should be two-thirds the length of the mainmast, and in thickness equal to the mizenmast. It carries the spritsail yard, and, at its outer end, the flying jib-boom. It also carries the jack-staff. The standing rigging attached to it includes the fore-topgallant stay, the fore-topmast stay, the fore-topmast preventer stay, the forestay, the fore preventer stay, the martingale stay, the bobstays, the bowsprit shrouds, and the bowsprit horse.

Bowstring, a term applied to an old form of execution by strangling with a bowstring, once common in Turkey.

Bowstring Girder, a special type of girder much employed in the construction of small bridges.



BOWSTRING GIRDER.

The upper boom is curved to the shape of a bow; the lower boom is straight, and the bracing of various designs. The Saltash girder bridge on the Great Western Railway is an example.

Bowyer, SIR GEORGE, third son of Sir William Bowyer, Bart., was born about 1738, became a lieutenant in the navy in 1758, and attained the rank of post-captain in 1762. In the *Albion*, 74, he was present in Byron's action with D'Estaing on July 6th, 1779, at the attack on the French squadron in Fort Royal Bay, and in April, 1780, in Rodney's action with De Guichen, off Martinique. He also took part in the actions of May 15th and 19th following; but his vessel lost very heavily, having 24 killed and 123 wounded on the two last named occasions. He continued to hold various commands, and in 1793 he hoisted his flag as a rear-admiral in the Channel fleet under Lord Howe. His flagship, the *Prince*, 98, was conspicuously engaged in the action of the glorious First of June, 1794, when the rear-admiral, losing a leg, was incapacitated for further service at sea. As a reward he was created baronet, honoured with the thanks of both Houses, and given a pension of £1,000 a year. A month after the action he became vice-admiral, and in 1799 admiral He died in 1800.

Bowyer, SIR GEORGE (1811–1883), English writer and public man. He was born at Radley, in 1811, and was called to the Bar in 1839. Being converted to Catholicism in 1850, he became the defender of the establishment in England of the papal hierarchy, and published a pamphlet on *The Cardinal Archbishop of Westminster and the New Hierarchy*. He sat in Parliament for Dundalk (1852–68), and for Wexford (1874–80). He wrote some works on *Civil and Constitutional Law*, and a *Dissertation on the Institutions of the Italian Republics*.

Bowyer, WILLIAM (1699–1777), English printer and scholar. He was educated at Cambridge, and afterwards joined his father in business. He was appointed printer to the House of Commons, to the Society of Antiquaries, and to the Royal Society, and printer of the Rolls of the House of Lords, and of the Journals of the House of Commons. Besides writing essays on *The Origin of Printing*, and philological tracts, he issued an enlarged edition of Schrevelius's *Greek Lexicon*, and a translation of Rousseau's *Paradoxical Oration*.

Boxer Cartridge, a metallic cartridge invented in 1852 for the Snider rifle. It consisted of four main parts—the shell or case, the fulminate, the powder, and the projectile. The bullet, a conical one, had a wooden plug in its notch, and an aperture filled with clay at its base. The charge of powder was 75 grains, and the weight of the entire cartridge and bullet 755 grains, the bullet of the perfected (No. 3) pattern weighing 480 grains.

Boxers, the name given to a sect of fanatics in China who were responsible in 1900 for a rising against the foreigners which was countenanced by the authorities, and culminated in the siege of Pekin. They were afterwards disavowed by the Government.

Boxing Day, the 26th of December, when Christmas boxes are given in England, by custom, to postmen and others.

Boxslaters, a family of ISOPODA known as *Idotheidæ*, which is characterised mainly by the lengthening of the body and the fusion of the hard parts of the hindmost segment into a tail shield. They are especially common in the Baltic.

Box-thorn, a name applied to the various species of the genus *Lycium*, belonging to the order *Solanaceæ*. They are shrubs, natives of the Mediterranean region and of tropical America, with funnel-shaped corolla, stamens opening lengthwise and a two-chambered nuculane with a persistent calyx. *L. barbarum*, with small lilac flowers, is

known as the Duke of Argyll's tea-tree, its leaves having been recommended as a substitute for tea. It is often seen as an escape in hedge-rows.

Boxwood, the wood of the Box, *Buxus sempervirens, B. balearica,* and *B. Macowanii. Buxus* is the type of the sub-order *Buxineæ* of the order *Euphorbiaceæ.* It consists of woody plants with opposite, entire, evergreen leaves, monœcious flowers in axillary glomerules, each flower having four sepals and either four stamens or a three-styled ovary. The fruit is dry, dehiscent, three-chambered and six-seeded. The common, or evergreen box (*B. sempervirens*) is a native of Japan, China, N. India, Persia, North Africa, and Europe south of lat. 52°. It is doubtfully indigenous at Boxhill in Surrey. The whole plant is bitter and poisonous. It may reach 30 feet in height and its stem 10 inches in diameter. The leaves are leathery, dark green, shining, elliptical and less than an inch long. A dwarf variety is used as an edging for garden-borders. *B. balearica,* native of the Mediterranean region, reaches 60 or 80 feet in height and has paler leaves three inches long. *B. Macowanii,* native of Cape Colony, has only recently been introduced into commerce. Boxwood from its hardness and closeness of grain is most valuable for walking-sticks, turnery, musical and mathematical instruments, and above all, for wood engraving. The best wood comes from Odessa, Constantinople, and Smyrna, in logs 4 feet long and 8 or 10 inches across, which are cut across the grain into slices type-high. Hawthorn, American dogwood (*Cornus florida*), several species of ebony (*Diospyros*) and the West Indian box-tree (*Tecoma pentaphylla*) are among the chief substitutes proposed, owing to the scarcity of box, but none of them are altogether satisfactory. Box is the badge of the clan M'Intosh; the variegated variety, that of the M'Phersons.

Boyaca, a state of Colombia, bordering on Venezuela, area 33,351 square miles. It is crossed in the north-west by the Eastern Cordilleras, but the east is fertile prairie watered by the Meta, the Guaviar, and other tributaries of the Orinoco. The state derives its name from a victory gained by Bolivar over the Spaniards in 1819, at the village of Boyaca, close to Tunja, the capital. The state produces fine emeralds, and there are coal, copper ore, iron, plumbago, and salt springs.

Boyars, the old nobility of Russia, who practically controlled the Czar until their power was broken by Peter the Great. Also the landed aristocracy of Roumania.

Boy Bishop. During the middle ages, both in England and on the Continent, it was customary on December 6, the festival of St. Nicolas, the great patron saint of children, for one of the choristers in cathedral and collegiate churches to be elected bishop by the rest. He then performed most of the usual episcopal functions, holding visitations, preaching sermons, and sometimes even leading mass. If he died during his episcopate, which, however, always terminated on the Innocents' day ensuing, December 28, he was buried with episcopal honours. Archbishop Peckham in 1279 limited the term of office to 24 hours, the election taking place on St. John the Evangelist's day, December 27, and the practice was attacked by various ecclesiastical councils. It was abolished in 1541 by Henry VIII., but restored by Mary in 1556, and John Stubbs, a chorister of Gloucester cathedral, who preached his sermon on Innocents' day, 1558, was probably the last English boy bishop. The Eton Montem (q.v.) has been traced to the practice, which is said to exist now in the College of the Propaganda at Rome.

Boyce, WILLIAM (1710–1779), English composer. He was born in London, became a chorister of St. Paul's, was composer to the Chapel Royal (1736), and organist (1758). From 1755 he was master of the king's band, and in 1749 he received the degree of Mus. Doc. from the University of Cambridge. He is best known by a collection he made of the church music of old masters. He also composed oratorios, symphonies, motets, and some theatrical music. Among the latter may be mentioned the song, *Hearts of Oak,* which used to be sung on going into action by such crews as had not a band, during the naval wars of the 18th century and the beginning of the 19th. His services and anthems are still extensively used.

Boycott. Captain Boycott, the agent of an Irish landlord in Connemara, having had disagreements with the tenantry in 1880, the whole population of the neighbourhood refused to have any dealings whatever with him. Hence his name was applied both as a noun and a verb to this practice, common in Ireland during the agrarian agitation, 1880–1890, defined by Mr. Gladstone as "exclusive dealing," and by Mr. Parnell as "leaving severely alone." It speedily passed to the United States, and has since been a common feature of labour disputes.

Boyd, ANDREW KENNEDY HUTCHISON, born 1825, Scottish clergyman and man of letters. He was educated at King's College, London, and Glasgow University. He was chiefly known as the author of a variety of articles in *Fraser's Magazine,* the chief of which have been collected and republished. His *Recreations of a Country Parson, Leisure Hours in Town,* and his *Sermons* attracted many readers. He died in 1899.

Boydell, JOHN (1719–1804), English engraver, and publisher of prints. Although of no mean power himself as an engraver, it is as the patron and encourager of the English print trade, which he found in a languishing state, and made it his business to revive—that he is chiefly known. He had engraved 96 plates in illustration of Shakspeare, from paintings which he commissioned the first painters of the day to provide. He also illustrated Hume's *History of England* with 196 plates. This work of art swallowed up his fortune, and landed him in considerable difficulties. He was Lord Mayor of London in 1790.

Boyer, ALEXIS (1757–1833), a clever French surgeon and learned anatomist. He made his

early studies under difficulties, introducing himself without authority into the anatomy schools and performing little services for the students, only demanding as reward legs and arms, and odd portions of subjects, which he dissected with ardent zeal. His passion for work met with its reward, slowly but surely, and his treatise on *Anatomy*, and his treatise on *Surgical Diseases*, became and long remained text-books. He was surgeon at the hospital La Charité, and Napoleon appointed him his own surgeon, and made him baron. After the downfall of Napoleon he became consulting surgeon to the king, and a member of the Institute. His fault was perhaps too great a conservatism, and opposition to all novelties.

Boyer, JEAN PIERRE (1776–1850), patriot and President of the republic of Hayti. He was born of a negress and a Creole father, and was one of the first to take arms in defence of negro enfranchisement. In the struggle between Toussaint-l'Ouverture and Rigaud he took part with the latter, and followed him after his defeat to France. Later he took part as captain under General Leclerc in the St. Domingo expedition, but when, on the submission of Toussaint-l'Ouverture, Leclerc showed that it was his intention to revive slavery, Boyer left him and, like Pétion, joined his brother negroes. Under Pétion's presidency he was successively colonel and general of division. In 1818, on Pétion's death, he became president, and in 1820 he united the kingdom of King Christophe to the republic, and in 1823 he took possession of the Spanish port of St. Domingo. He also obtained the recognition of the independence of Hayti by France, on payment of a large sum. He was an enemy of all reform, and was not a popular president, being credited with a wish to advance his own personal views rather than to seek the good of the country. A revolution in 1843 drove him from his seat, and he retired to Paris, where he passed the rest of his life.

Boyle, CHARLES (1676–1731), author, soldier, and statesman; second son of Roger, second Earl of Orrery. He was thrice member for Huntingdon, became Earl of Orrery in 1703, and being in favour with the queen's ministry he was made major-general, and privy councillor in 1709. He was appointed royal envoy to Brabant and Flanders, and was created Baron Marston, in the peerage of England. Under George I. he fell into disfavour with the authorities, and was twice committed to the Tower. The Orrery was named after him by its constructor Gresham. He translated Plutarch's *Lysander*, and an edition which he published of the *Epistles of Phalaris* involved him in a controversy with Bentley.

Boyle, JOHN (1707–1762), son of the Charles last mentioned, Earl of Cork and Orrery. He was educated at Christ Church, Oxford, but his poor health precluded him from adopting an active life, and he devoted himself to literature, without, however, producing work of any high order of merit. He was a friend of Pope and Swift, and published *The Letters of Pliny the Younger*, a *Life of Swift*, and *The Memoirs of Robert Carey, Earl of Monmouth*. There was a posthumous edition of his *Letters from Italy*.

Boyle, RICHARD (1566–1643), founder of the house of Cork and Orrery, born at Canterbury, of a Hertfordshire family, educated at Cambridge and at the Middle Temple, went to Ireland and, marrying well, bought large estates, and greatly improved them by prudent management. He also did much to develope manufactures and mechanical art in Ireland, and made a fortune by his efforts. Knighted in 1603, he was made Earl of Cork in 1620. He was in disfavour with Strafford, but held his own, and lived to extinguish a rebellion in his old age.

Boyle, ROBERT (1626–1691), is perhaps the best known of the family, being, as was once said of him, with a curious mixture of literalness and metaphor, "father of modern chemistry and brother of the Earl of Cork." He was renowned as a natural philosopher, and was one of the founders of the Royal Society. Born the seventh son of Richard, Earl of Cork, he went to Eton while Sir H. Wotton was Provost. From Eton he went to Stalbridge, in Dorset, where he was for some time under a private tutor. After travelling and studying abroad he settled down in 1646 at Stalbridge, which estate had devolved upon him; and in 1654 he began a fourteen years' residence at Oxford. His principle of philosophy was that interrogation of nature which Bacon had inaugurated, and he made some valuable experiments upon the nature of air and its conditions and properties. He did not confine his attention to natural philosophy. Theology occupied much of his time, and he was especially interested in Orientalism, and in the spread of Christianity in the East. His friends had tried to persuade him to take orders, but he preferred to remain a layman. He shared in translating the Scriptures, or parts of them, into Malay, Irish, Welsh, and Turkish; and superintended the translation into Arabic of Grotius' *De Veritate*. In 1660 he published his *New Physico-Mechanical Experiments* touching the spring of air. In 1663 he was on the Council of the Royal Society, and in 1680 its president. In 1690 his health gave way, and he resigned his public employments, still, however, carrying on his private researches. He died at the end of 1691, and was buried at St. Martin's-in-the-Fields. Like Newton, he turned his attention to alchemy, and seems to have had some belief in a possible transmutation of metals. His works are numerous, and he founded the lectures, which bear his name, for the defence of Christianity against its opponents, atheistic, theistic, and others.

Boyle, ROGER (1621–1679), soldier and statesman, was the fifth son of the Earl of Cork. Having distinguished himself at Dublin University, he made a tour in France and Italy, and on his return, after marrying Margaret Howard, sister of the Duke of Norfolk, he went over to Ireland and aided his father in his struggle against the rebels. He retired to his estates in England upon King Charles I.'s death, but tired of inactivity he had

resolved to go abroad and join in the attempts to restore Charles II. Cromwell, however, getting knowledge of his intention, and knowing his value, intercepted him at London, and prevailed on him to accept a general's command in Ireland against the rebels. This he did, and served Cromwell faithfully, and was a member of his Privy Council during the Protectorate. On the death of Cromwell Robert Boyle left the falling house, and was instrumental in the restoration of Charles II., who made him Earl of Orrery. He had great influence in public affairs, but a quarrel with the Duke of Ormond brought him to England. He was impeached, but the prosecution failed; and though he had to give up his public employments he remained in great favour with the king, who often consulted him. He was a brave soldier and a good handler of troops.

Boyle Lectures, a series of eight sermons against infidelity, to be preached in the Chapel Royal, Whitehall (now closed), endowed by the Hon. Robert Boyle (q.v.), 1691.

Boyle's Law, in *Physics*, states that if a given quantity of any gas be subjected to any variation in volume while its temperature is kept constant, the pressure will vary in such a way that the product of volume and pressure remains a constant. Thus if the volume v of a certain mass of hydrogen be 40 cubic centimetres, when its pressure p is equal to that of 76 cms. of mercury, then if the temperature is kept constant throughout $vp = 76 \times 40 = 3040$ always. As a matter of fact the law is not perfectly obeyed by any gas, though the approximation becomes closer and closer as the temperature of the gas is taken farther from its point of liquefaction. Thus hydrogen and oxygen, which at ordinary temperatures are both far from their points of liquefaction, follow Boyle's law closely. Carbon dioxide, which is more readily liquefied, shows an evident discrepancy at ordinary temperature. [GAS.]

Boyne, a river of Ireland, which, rising in the Bog of Allen, near Carbery, in Kildare, flows through that county, King's county, Meath, and Louth, and enters the Irish Sea. It is navigable for barges up to about nineteen miles from its mouth, and for heavier craft as far as Drogheda, which is four miles up the river. Near this town is an obelisk marking the scene of the celebrated battle of the Boyne, fought in 1690. The chief affluents of the Boyne are the Mattock and the Blackwater.

Bozzaris, MARCOS, was born in 1788 at Suli, Epirus. After a period of refuge in the Ionian Islands, whither he with others had had to flee from Ali Pasha (q.v.), he headed in 1820 a force of his exiled countrymen in aid of their subjugator against the Turks. At Missolonghi, in 1823, he was commander-in-chief of the Greek forces, and made a daring and successful attack upon the Turkish vanguard, near Karpenisi. Bozzaris himself fell in this encounter, but his memory lives in the patriot songs of Greece.

Brabançonne, the national anthem of Belgium, composed during the revolution of 1830. The words were due to Jenneval, a French actor, the music to Van Campenhout, afterwards choirmaster to the king. Other words have since been written to the tune by the composer and other writers.

Brabant, the central district in the Netherlands, extending from the Waal to the head of the Dyle, and from the Meuse and plain of Limburg to the Lower Scheldt, was formerly a separate duchy, but is now divided between Belgium and Holland. It comprises three provinces, viz.: 1, North or Dutch Brabant, area 1,960 square miles, where the inhabitants are mainly Dutch; 2, the Belgian province of Antwerp, area 1,095 square miles, where the inhabitants are mainly Flemings; and 3, South Brabant, also Belgian, area 1,276 square miles, where the inhabitants are mainly Walloons. As to the general aspect of the country, it is for the most part a plain sloping gently towards the north-west, with, in the south, a few low hills and the forest of Soignies, and in the north, level tracts. The principal rivers are the Meuse and the Scheldt with their tributaries. The soil is fertile and well cultivated, agriculture and cattle-raising being extensively engaged in. Chicory, hops, and tobacco, are also grown, and amongst the industries, besides the well-known Brabant lace, are the production of sugar from the beet, of earthenware, leather, salt, thread, woollens, etc. The chief towns are Brussels, Hertogenbosch, Bergen-op-Zoom, Tilburg, Louvain, etc. [BELGIUM.]

Braccio, FORTEBRACCI, Count of Montone, was born in 1368, at Perugia. After military service on behalf of different causes he was entrusted with the command of his native city, being made by Queen Joanna of Naples Count of Foggia and Prince of Capua. Aiming at the throne of Naples, he received his death wound before Aquila, in 1424, while fighting to attain his end.

Brace, a support or stay of various kinds. In a square-rigged vessel a rope used for wheeling or traversing a sail upon a mast, in order to make it correspond with the direction of the wind or the course of the ship. It is fastened to the yard-arm. The braces of all yards are double, except those of top-gallant and, when these are carried, spritsail and topsail yards. The mizen yard has vangs, or fangs, instead of braces. A brace is also a piece of iron supporting, for example, a poop lantern, or a screwshaft. In *Architecture* it is a piece put across the angles of a building. [*See also* BRACKET.]

Bracelet (Old French, connected with *bras*, arm), an ornamental ring or band for the wrist, usually of gold or silver, sometimes set with gems. A common variety is the BANGLE (q.v.). Such bracelets, as well as anklets, were worn by the ancient Persian kings and nobles. Greek and Roman ladies frequently wore bracelets, as did Roman men under the empire occasionally, and

they were sometimes conferred on soldiers as a decoration for valour. Both Greek and Roman bracelets were often of a snake form. Among the Kelts bracelets were often worn by men. Ironically, the term is sometimes applied to handcuffs.

Brach, BRACHE, an old name for a dog that hunted by scent; the word was afterwards restricted to denote a bitch. (See *Lear* i. 4.)

Brachelytra, a section of beetles including two families of which the rove beetles, or Staphylinidæ, are the more important. The devil's coach-horse is the best known English species of this family.

Brachial Artery, the name given to the chief artery of the upper arm. The subclavian artery of the neck is continued through the axilla or arm-pit, as the axillary artery, and after passing through this region, the further continuation of the vessel is called the brachial artery. It runs down the upper arm on its inner aspect, accompanied by two veins, and gives off several branches, mainly concerned in supplying muscles; just below the bend of the elbow the brachial divides into the radial and ulnar arteries.

Brachiolaria, the name of the type of star-fish larva which is provided with a calcareous skeleton. It also differs from the BIPINNARIA (q.v.) form by the possession of three additional arms.

Brachiopoda (*i.e.* arm-footed), or "lamp-shells," a group of soft-bodied animals protected by a shell of two valves, and hence regarded as a close ally of the bivalved shell-fish (Lamellibranchiata) (q.v.) which were included with it in the now obsolete division, the Conchifera. The group is one of great interest both to zoologists and geologists; to the former, owing to the uncertainty as to its exact place in the animal kingdom, and to the latter, owing to the abundance of fossil forms. Though somewhat rare in existing seas, the brachiopoda were once extremely common; probably the oldest known fossil belongs to this class, and for a long period it was the predominant type of shell-bearing animals. The resemblances between these and the bivalved mollusca are quite superficial; when the anatomy and development of the recent brachiopods were studied, it was found that the two groups were so different that no close relation between them could be maintained. The shells can be readily distinguished from those of Lamellibranchs, since the two valves are never exactly equal, while they are always equilateral; whereas in the latter the valves are often equal, but never truly equilateral. The microscopic structure of the shells is also very different in the two classes, as is also the position of the valves in relation to the animal; thus in the Lamellibranch they are placed one on each side, whereas in the Brachiopod they are front and back, like the boards of a sandwich-man. It is now considered that the class is most closely related to the Bryozoa (q.v.), while the development (especially of *Lingula*) shows that it has affinities with the worms. The Brachiopoda are all marine, and most of them live at a considerable depth, fixed to other shells or rocks, either directly by one valve, or by a fleshy peduncle or stalk, which passes out through a fissure between the two valves, or more usually through an opening in the larger valve; a few living species, however, burrow through sandbanks. In most forms there is an internal skeleton composed of a pair of supports, which are usually coiled, for the arms; the two arms are provided with small branches or cirri which serve for respiration. This structure is homologous (q.v.) with the lophophore of Bryozoa (q.v.). The nervous system consists of but one ganglion, another point of difference between these and the mollusca. The class is divided into two orders: the Articulata, including those with a hinge and support for the arms, but without an anus; and the Inarticulata, those lower forms without the two first, but with the last structure. As regards their range in time, they commence at the very base of the fossiliferous series (viz. the Cambrian period), and attained their maximum in the Silurian, since which they have been dwindling in numbers. A few species occur in the deeper parts of the British seas.

Brachycephalic, a term applied to races of man in whom the diameter of the head is not much less from side to side than from front to back, the ratio of these measurements being 4 to 5. The Mongolians are brachycephalic.

Brachymetopus, a genus of TRILOBITES (family *Proetidæ*), of interest, as it was one of the last surviving genera: it occurred in the Carboniferous rocks.

Brachypteræ (*i.e.* having short wings), a name introduced by Cuvier for the Diving Birds: it is obsolescent, if not obsolete.

Brachypyge, a fossil crustacean from the Carboniferous system; it is of interest, as it may be one of the BRACHYURA.

Brachyura (*i.e.* short-tailed), the highest sub-order of the *Decapoda*, an order of *Crustacea*: the crab is the best known example. The main character of the group is that the tail (or strictly the abdomen) is very short and tucked up closely beneath the body, so that it is useless for swimming and cannot be seen from above; moreover, the body is wide instead of long, so that the nervous "ganglia" or centres are connected more closely together than in such long-tailed, elongated forms as the lobster. The majority of the group are marine, living on the shore; they rarely swim, but a few are enabled to do so by means of their flattened limbs; they can live for some time out of water, and some families live on land and only go to the sea at breeding time. Such *e.g.* are the Land Crab of the genus *Gecarcinus*, or the West Indian *Gelasimus*. The Brachyura are world-wide in distribution, and are first certainly known from the Cretaceous; but doubtful forms occur much earlier. A general account of the anatomy and life history is given under Crab (q.v.), and this should be compared with the article on Lobster, as the type of the long-tailed *Decapods*.

Bracken, or BRAKE, the common English name for *Pteris aquilina*, the commonest fern of Northern Europe, which is also widely distributed in temperate and tropical regions. It occurs on heaths and moors and in forests, with a creeping rhizome, tough tripinnate or quadripinnate erect fronds, 1 to 10 feet high, and sori or clusters of sporangia all along the recurved under margin of the pinnules. As these sporangia lie between two indusia or membranes, the species may have to be transferred to the genus *Pæsia*. The complicated bands of dark sclerenchymatous tissue in the stem and leaf-stalks are popularly known as King Charles's oak. At the primary trifurcation of the fronds there are in the young stage glands exuding honey which attract ants. Bracken is the badge of the clan Robertson.

Bracket, a shelf or support fixed to a wall and projecting at right angles to it. The name is also applied to the iron stays which sometimes support shelves, etc., to a gaslight projecting from a wall, and to the signs [ ] ( ) used by printers to enclose a parenthesis, as also to the sign }, denoting that the objects whose names it connects are to be taken together.

Bract, a leaf in, or immediately below, an inflorescence, having in its axil either a flower-bud or a branch bearing flower-buds. The main function of the bract is to protect the young buds. It may be *leafy*, differing in no respect, save position, from an ordinary foliage-leaf, as in the dead-nettles; or it may be rigid or *glumaceous*, as the so-called "chaff" in grasses and sedges; or it may be thinner, brown or colourless and *membranous*, as in Pelargonium; or it may be conspicuously coloured, so as to serve an attractive purpose such as is usually the function of the corolla, as in Poinsettia or Bougainvillea (q.v.). If a bract is large and encloses a whole inflorescence it is termed a *spathe*, and spathes may similarly be leafy as in Arum maculatum, membranous as in palms, or coloured and fleshy as in Anthurium or Richardia. A circle or larger collection of bracts below an inflorescence is termed an *involucre*, as in the case of the three leafy bracts on the flower-stalk of *Anemone nemorosa*, the two circles of bracts, the outer recurved, in the dandelion, the fleshy-based bracts of the artichoke, the coloured circle of bracts of Astrantia, etc. The flower in the axil of a bract, if belonging to a dicotyledon, has often two smaller bracts or *bracteoles* placed laterally on its pedicel, as may be seen in violets. If a monocotyledon, there is only one bracteole on the pedicel on the side nearest the bract. The scales in the catkins of some trees and the husk that remains under the name of *cupule* round the fruit of others, as, for example, the "cup" of the acorn, are variously made up of confluent bracts and bracteoles, and the minute scales or *paleæ* among the florets on the common receptacle of some *Compositæ* may be looked upon as bracteoles.

Bracton, HENRY DE, law writer, flourished in the 13th century. His birth-place is variously ascribed to Bratton Clovelly, near Okehampton, Bratton Fleming, near Barnstaple, and Bratton Court, near Minehead, Somersetshire. After studying at Oxford, and occupying the position of justice itinerant for the counties of Nottingham and Derby, he became, in 1264, archdeacon of Barnstaple, and chancellor of Exeter cathedral. It is, however, as the author of *De Legibus et Consuetudinibus Angliae*, that he is distinguished. He died in 1268.

Braddock, EDWARD, general, was born about 1695 in Perthshire. Appointed major-general of the Coldstream guards in 1754, he commanded the British troops in America against the French. His disastrous attempt to invest Fort Duquesne in 1755 resulted in 63 out of 86 officers, and 914 out of 1,370 men being either killed or wounded. He himself had four horses shot under him, and received a wound from which he died in a few days.

Braddon, MARY ELIZABETH, novelist, is the *nom-de-plume* of Mrs. John Maxwell. She was born in 1837 in Soho Square, London. She brought out her novel, *Lady Audley's Secret*, in 1862, and immediately achieved popularity. Quite as widely read was her next novel, *Aurora Floyd*, produced in 1863. She has gone on ever since producing books with great industry; she also edited *Belgravia* for a few years, and was an extensive contributor to *Temple Bar*, *St. James's Magazine*, and other periodicals.

Bradford, a parliamentary and municipal borough of England in the West Riding of Yorkshire, is situated on a tributary of the Aire, and is connected by a branch canal with the Liverpool and Leeds canal. It is the chief centre in England of the spinning and weaving of worsted yarn and woollens, and also manufactures alpaca stuffs, silks, velvets, plush, cotton, etc. Near it are coal and iron mines, and stone quarries. Among its public buildings are the old parish church of St. Peter, St. George's hall, mechanics' institute, markets, town-hall, public library, grammar school, and technical college. It has also five public parks, covering an area of over 200 acres. The town is also adorned with statues of Sir Robert Peel, Sir Titus Salt, etc. Pop. (1901), 279,809.

Bradford Clay, a local deposit of pale-grey calcareous clay, with seams of tough brown limestone and calcareous sandstone, occurring at various horizons near the upper part of the Bathonian or Great Oolite, and named from its occurrence at Bradford-on-Avon, Wiltshire. It is generally below the Forest Marble, and corresponds, no doubt, in part to the Blisworth or Great Oolite Clay of Northamptonshire. Its greatest thickness seems to be near Farleigh, where it is between 40 and 60 feet. Its most characteristic fossils are *Waldheimia digona* and *Apiocrinus rotundus* (or *Parkinsoni*). The latter is known as the Bradford or Pear Encrinite, its "calyx" or body much resembling a pear, whilst single joints of the stem are called "coach-wheels." In Wiltshire numbers of these encrinites may be seen attached to the upper surface of the underlying limestone where

they lived until overwhelmed by the clayey sediment in which their remains are now imbedded.

Bradford-on-Avon, or GREAT BRADFORD, an ancient town in England, in the county of Wiltshire, is pleasantly situated on the Avon, which intersects the town. It contains many interesting architectural remains, amongst them being the only perfect example of a pre-Norman building in England, viz. the Church of St. Lawrence. It used to be an important woollen manufacturing centre, and has stone-quarries in the neighbourhood. Pop. (1901), 4,514.

Bradlaugh, CHARLES, M.P., was born in 1833 in London. He led a somewhat chequered career, being errand-boy, small coal-merchant, pamphleteer, private soldier, clerk to a solicitor, etc. He advocated secularism and espoused the Radical movements of his time, establishing in 1860 *The National Reformer*, and writing and speaking under the name of Iconoclast. In conjunction with Mrs. Annie Besant he brought out in 1875 an old pamphlet, *The Fruits of Philosophy*, as a challenge on a point of law. For this they were sentenced to six months' imprisonment and a fine of £200—a sentence that was reversed on appeal. In 1880 Bradlaugh was returned to Parliament for Northampton, and on account of his refusal to take the oath a long struggle between him and the House of Commons ensued. Northampton returned him four times as a protest against the treatment he received in Parliament, and not until the general election of 1885 was he allowed to take his seat. His Oaths Bill was made law in 1888. He died in 1891, having previously won the respect of all parties in the House of Commons. Amongst his writings the most widely read was his *Impeachment of the House of Brunswick*, 1872.

Bradley, EDWARD, REV. (1827–1889), born at Kidderminster. Educated at Durham University, he was presented to the living of Denton, Hunts, then to Shelton, near Oakham, and next to Lenton, near Grantham. He was best known as "Cuthbert Bede," his *nom-de-plume*, and as the author of *Verdant Green*, his most popular production.

Bradley, JAMES, astronomer, was born in 1692 at Sherborne. His mathematical bent attracted the notice of Halley, Sir Isaac Newton, and other leading scientists of the time, and in 1721 he was appointed professor of astronomy at Oxford. A few years afterwards he published his discovery of the aberration of light, and in 1748 his discovery of the varying inclination of the axis of the earth to the ecliptic. Meanwhile, in 1742, he had succeeded Halley as Astronomer-Royal at Greenwich. His astronomical observations, numbering about 60,000, were published at Oxford in 1805. He died in 1762 at Chalford, Gloucestershire.

Bradshaw, JOHN, president of the High Court of Justice that tried Charles I., was born in 1602 near Stockport, Cheshire. Called to the bar at Gray's Inn in 1627, he became a bencher in 1645, and acted for some time as judge in the sheriff-courts of London. In 1649, when the trial of the king was decided on, he was appointed president of the High Court of Justice, receiving as a reward the presidency of the Council of State, and the chancellorship of the Duchy of Lancaster with estates worth £2,000 a year. He opposed the Protectorate subsequently, and got into disputes with Cromwell, who tried to deprive him of the chief justiceship of Chester. After Cromwell's death he became lord-president of the Council, dying in 1659. After the Restoration his body, which had been interred in Westminster Abbey, was disinterred and gibbeted with the bodies of Cromwell and Ireton.

Bradshaw's Guide. Mr. George Bradshaw, an engraver of maps at Manchester, published some maps of the canal systems of Lancashire, Yorkshire, etc., about 1830. On the rise of the railway system he performed the same service for it. His first railway publication (only four copies of which now exist) appeared October 1, 1839. It was a little book of 28 pp., bound in cloth, and consisting chiefly of maps of towns, with time-tables appended of the few railways then open. Later on, *Bradshaw's Railway Companion*, also bound in cloth, was issued irregularly as an occasional publication. But the regular issue of the familiar *Bradshaw* began in 1841, at the suggestion of the London agent, Mr. W. J. Adams. It consisted of only 32 pages; the time-tables were also published in a broadsheet. Shortly afterwards the list of sailings and of steamers was added, and since then, despite much ingenious economising of space and weight, it has swelled to a book containing as much type as twelve volumes of an ordinary 8vo novel, and containing a mass of information nowhere to be found within the same compass. *Bradshaw's Continental Guide* began in 1847. The early guides (two of which have been recently reprinted in facsimile) are amusing to the modern traveller. Seats in the train were apparently numbered, and booked as in a coach. If a compartment was taken by a party, the fares were reduced. "Glass coaches" were apparently one variety of first class carriage. Passengers were requested "not to leave their seats when the train stops, to avoid undue delay." Mr. Bradshaw was a member of the Society of Friends, and hence the date on the cover long had the form "1st mo. (January) 1850." He died of cholera while on a tour in Norway, 1853. *The Story of Bradshaw* has been told by Mr. Percy Fitzgerald, and most of the above facts are taken from his account.

Bradwardine, THOMAS, Archbishop of Canterbury, was born about 1290 at Hartfield, Sussex. Educated at Merton College, Oxford, he afterwards became chancellor of the University, and professor of divinity. As chaplain and confessor of Edward III. he accompanied that sovereign to France, and was present at Crecy and the capture of Calais. On the death of Stratford, in 1348, Bradwardine was elected archbishop of Canterbury. He was on the Continent at the time of his election, and went direct to the papal court at Avignon for consecration. In 1349 he landed in England, and a few days after his arrival died of

the black death. He was named "Doctor Profundus," from his treatise *De Causa Dei contra Pelagium, et de virtute causarum.*

Brady, NICHOLAS, divine and poet, was born in 1659 at Bandon, county Cork. Educated at Westminster, Christchurch (Oxford), and Dublin, he subsequently held the rectorship of St. Catherine Cree, London, and then of Richmond, Surrey. In addition to his metrical version of the Psalms, which was licensed in 1696, he translated Virgil's *Æncid*, and wrote some poems and dramas, now sunk into oblivion.

Bradypus. [SLOTH.]

Braemar, a district of the Scottish Highlands, in the S.W. portion of Aberdeenshire, contains part of the Grampian range of mountains with the heights Ben Macdhui, Cairntoul, and Lochnagar. In it is situated also Balmoral on the banks of the river Dee. It is much frequented by tourists and sportsmen.

Braga, a Portuguese city and capital of the province of Minho, is situated on an elevated plain between the rivers Cavado and D'Este. It is the seat of an archbishop, and the residence of the primate of Portugal. It has a fine 12th century Gothic cathedral, and, as the *Bracara Augusta* of the Romans, remains of a Roman temple, amphitheatre, and aqueduct. Its manufactures include linen and various articles of iron and steel ware.

Bragança, (1) a Brazilian sea-port at the mouth of the Caite river. (2) A Brazilian town, 50 miles N.E. of Sao Paulo, in a fertile inland district, which supplies the Rio Janeiro market with cattle and pigs.

Braganza, a Portuguese city, and capital of the province of Tras-os-Montes on the Ferrenza, is the seat of the bishop of Braganza and Miranda, and gives its name to the house of Braganza, the reigning house of Portugal, John, eighth duke of Braganza, having in 1640 ascended the throne as John IV. In the town is a citadel, a college, and a hospital. It has also manufactures of silks and velvets.

Bragg, BRAXTON, general, was born in 1817, in N. Carolina. After receiving a military training, he served in the Seminole and Mexican wars, and later was commander in several great battles of the Civil war. He died in 1876 at Galveston, Texas.

Bragg, THOMAS, brother of the preceding, was born in 1810. Governor of his native state, N. Carolina, from 1854 to 1858, he ultimately became attorney-general in Jefferson Davis's cabinet, and died in 1872 at Raleigh.

Bragi, a character in northern mythology, and son of Odin, the god of poesy and eloquence, is represented as an old man with a long, flowing white beard. Heroes that fall in battle are welcomed by him on their reaching Valhalla.

Braham, JOHN, vocalist, was born in 1774 in London, of Jewish descent. In 1787 he made his first appearance in public at Covent Garden theatre. In 1796, after his voice had broken. he made a hit in Storace's opera *Mahmoud* at Drury Lane, and thereafter set out upon a most successful continental tour. He returned in 1801, and continued to sing in public till within a year or two of his death, maintaining his supremacy as the leading vocalist in Europe. He accumulated a large fortune, purchased the Colosseum, Regent's Park, and built St. James's theatre. Sir Walter Scott described him as "a beast of an actor and an angel of a singer." He died in 1856 at Brompton, leaving six children, one of whom, Frances, married the Earl of Waldegrave in 1840, and became a notable figure in society.

Brahé, TYCHO, astronomer, was born in 1546 at Knudstorp, in the county of Schonen, Sweden. He early exhibited a bent towards astronomical science, and though he was destined for the legal profession and sent to Leipsic to study for that purpose, he would yet, when his tutor had gone to bed, spend his nights in viewing the stars. At Rostock, in 1566, he lost part of his nose in a duel with a Danish nobleman, himself making good the defect with gold, silver, and wax. In 1672 he discovered a new star in the constellation Cassiopeia, and in the following year married a peasant girl much against the wishes of his relatives. So violent were the quarrels that ensued on this point, that the king was obliged to interfere. In 1580 he built an observatory on the island of Huen in the Sound, the site and money being provided by Frederic II., and here he pursued the observations that resulted in the planetary system associated with his name. After King Frederic's death the petty jealousy of the nobles obliged him to remove in 1597 to Germany, where he enjoyed the patronage of Rudolph II., who provided him with a residence and a pension, which, however, he did not live to enjoy for long. He died at Prague in 1601. At one time Kepler was his assistant and owed much to Brahé's influence.

Brahma. As a neuter noun, in Hindu theology, the word signifies the world-spirit, eternal, all-pervading and infinite, out of which all things proceed, and into which they are eventually resolved. It is not worshipped, but is an object of that meditation practised by Hindu sages, with a view to their ultimate reabsorption into it. As a masculine noun, Brahma signifies the first person of the Hindu Trimurti or Trinity, the Creator, as contrasted with Vishnu the preserver, and Siva, the destroyer, who destroys in order that he may reproduce. According to one account this personal Brahma arose from the water which was the first of existences: according to another, he came from a golden egg deposited by the impersonal Brahma, the world-spirit. Each day of his life lasts 2,160,000 years. At the beginning of every such day he creates the world, which, at its close, is resolved into its elements. Next day he creates it afresh, and so on till the end of his life of 100 years. Then, together with the gods and sages, who have survived the preceding destructions, and with Brahma himself, it is resolved into the original world-spirit. Brahma is especially the father of mankind, whom he begat by his own

daughter Saraswati (Speech). He is represented as red in colour, with four heads and four arms. He is invoked in worship, but is not worshipped himself, except at Pokhar, near Ajmir, in Rajputana. Indeed, some of his attributes and most of the honours paid him seem to have been transferred in the course of time to Vishnu and Siva. Thus some accounts treat him as a mere form of Vishnu, and he is sometimes said to have sprung from a lotus flower which grew from the navel of that deity. [VISHNU.]

Brahmanbaria, a town of Bengal, situated on the river Titas. Its chief trade is in rice.

Brahmaputra, a large river in Asia, has its sources in Thibet. After flowing eastwards for 1,000 miles under the name of the Sanpoo river, it turns southerly through the Himalayas, emerging in the N.E. of Assam as the Dihong. Here it is joined by the Dihong and the Brahmakoonda, and the united waters now named Brahmaputra, *i.e. Son of Brama*, flow southerly through Bengal and join the delta system of the Ganges. In the rainy season the Brahmaputra rises as high as 40 feet above its usual level, and irrigates the surrounding plains, which bear jute, mustard and rice. It is navigable to steamships for 800 miles from the sea, and its total length is estimated at 1,800 miles.

Brahmin Ox. [ZEBU.]

Brahmo Somaj (*Church of the One God*), a reformed Brahmin sect, originated in 1818 by Rammohun Roy, a wealthy and educated Hindoo, who was sent to England on a mission from the King of Delhi. It was stimulated more especially by Baboo Keshub Chunder Sen, who visited England in 1870, and died in 1884. It has had numerous branches, but there have been many secessions from it, and its actual members are not very numerous. It is an attempt at a reformed Hindoo Church, on the basis of pure Monotheism, and has some affinity with English Unitarianism.

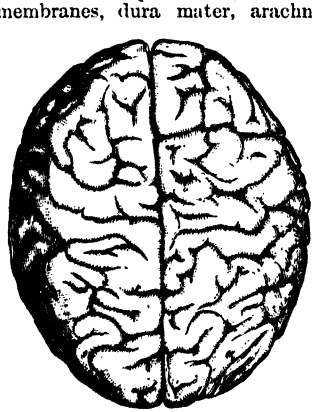
Brahms, JOHANNES, was born in 1833 at Hamburg, and after the death of Wagner was regarded as one of the greatest composers in Germany. He was greatly praised in 1853 by Schumann, who predicted his greatness in an article in the *Neue Zeitschrift für Musik*. But it was not until his visit to Vienna, in 1861, that Brahms found appreciation, where, after occupying other positions, he conducted the famous concerts of the *Gesellschaft der Musikfreunde*. In 1868 he composed his *Deutsches Requiem* and since then new compositions by him were regarded as events in the musical world. He died in 1897.

Brahui, the dominant and most numerous race in Baluchistân, which ought to be called "Brahuistân" (Pottinger). The Brahui differ profoundly from the Baluchi (q.v.), being chiefly highlanders of Mongoloid race and speaking an agglutinating language which shows some slight affinity to the Dravidian of Southern India. They regard themselves as the true aborigines and look on all others as intruders, at least in the Sarawân and Jalawân uplands, to which region the race is chiefly confined. Type, short, thickset figure, round face, flat features, small eyes and nose, yellowish-brown complexion, long black hair, sparse and short beard. They are divided into a multitude of tribes, the royal sept being the Kambarâni, of which the Khan of Kelat (paramount lord of Baluchistân) is a member. The Brahui are the *Baraha* of the early Rajput records. *See* Dr. Henry Walters, *From the Indus to the Tigris* (1874), and H. Pottinger, *Travels in Beloochistan*, etc. (1816).

Braila, or BRAHILOR, a town of Roumania, of which it is the principal port, is situated on the left bank of the Danube. Its chief exports are grain and the products of the sturgeon fisheries. The Greek cathedral is the chief among ecclesiastical edifices, of which there are twelve.

Brain. The term applied to that portion of the central nervous system which lies within the cavity of the skull. At its upper limit the spinal cord is continuous with the *medulla oblongata* or bulb which passes upwards through the foramen magnum into the cranial cavity. On the dorsal aspect of the medulla lies the *cerebellum*, and above the limit of the bulb on the ventral aspect are seen the transversely running fibres of the *pons Varolii*. Anterior to the pons the two crura cerebri diverge outwards passing into the *cerebral hemispheres*.

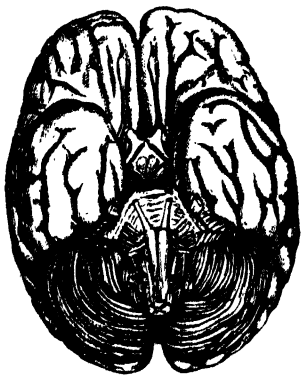
The brain, like the spinal cord, has three enveloping membranes, dura mater, arachnoid, and



THE BRAIN, VIEWED FROM ABOVE.

pia mater; the interval between the two latter is called the subarachnoid space, and is filled by the cerebro-spinal fluid. This fluid serves as a kind of packing material by which the delicate nervous structures are shielded from injury; in particular an accumulation of it at the base of the brain forms a sort of water cushion for its support. Another function of the cerebro-spinal fluid is to adapt the volume of the cranial contents to the unyielding walls of the cavity of the skull. When the amount of blood circulating in the brain is at a maximum, the quantity of cerebro-spinal fluid within the skull is at a minimum; and if on the

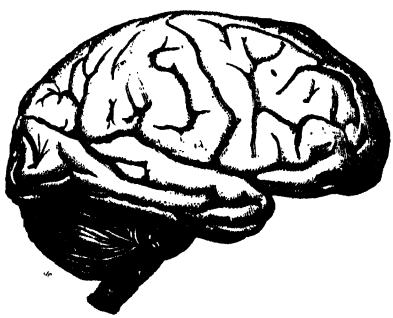
other hand the supply of blood to the brain diminishes, an increased amount of fluid accumulates in the subarachnoid space, and so compensates for the difference in the bulk of the anæmic as compared with the hyperæmic brain. The fluid of the



THE BRAIN, VIEWED FROM BELOW.

subarachnoid space is in direct communication with the fluid occupying the central canal of the spinal cord.

The weight of the brain of an adult man averages about 50 oz., that of an adult woman about 45 oz. The human brain is heavier than that of any other animal, the elephant and whale excepted. The proportion of brain-weight to body-weight is also greater in man than in the rest of the animal kingdom, with one or two exceptions among small birds and small monkeys. The relation between brain-weight and intelligence is however not one



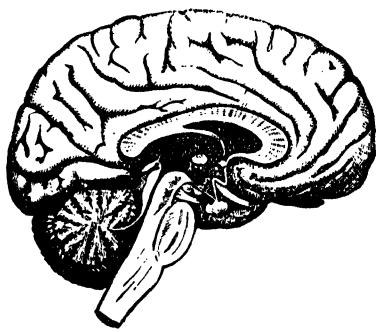
THE BRAIN, VIEWED FROM THE RIGHT SIDE.

which can be insisted upon. Probably the extent of infolding of the convolutions of the cerebral hemispheres is a factor of more importance than actual weight in highly developed brains.

The cerebral hemispheres form the main bulk of the human brain; they are divided up by fissures into five lobes on each side, *frontal*, *parietal*, *occipital* and *temporo-sphenoidal*, with the *island of Reil*. These lobes are further subdivided into convolutions by secondary fissures. The most important fissures are the *Sylvian*, between the parietal lobe, above, and the temporo-sphenoidal below, the *fissure of Rolando* on the outer aspect of the parietal lobe, and the *parieto-occipital* separating the parietal and occipital lobes on the median aspect of the hemisphere. A section of a cerebral hemisphere shows a mass of white matter ensheathed by a thin outer envelope, or cortex, of grey matter. This grey matter follows all the undulations of the convolutions, and thus the more furrowed by fissures a brain is, the larger is the area of grey matter exposed on its surface.

Microscopical examination shows the white matter to be made up of medullated nerve fibres, while in the grey matter numerous ganglion cells are found.

Running across the bottom of the fissure which separates the two hemispheres is the great white commissure, called the corpus callosum. A horizontal section of the brain made just below this structure reveals the so-called basal ganglia, the



INNER ASPECT OF THE LEFT HALF OF THE BRAIN (RIGHT HALF BEING REMOVED).

corpora striata anteriorly, and the optic thalami posteriorly. The two last-named bodies lie on each side of a cavity, called the third ventricle. This cavity communicates in front through the foramen of Munro with the lateral ventricles, which lie one in either hemisphere; behind it is in communication through the *aqueduct of Sylvius* or *iter a tertio ad quartum ventriculum* with the fourth ventricle, which lies on the dorsal aspect of the medulla oblongata. There is yet another cavity, that of the fifth ventricle (of different origin to the other ventricles), placed in the *septum lucidum* a partition separating the two lateral ventricles from one another.

Sections made through the basal ganglia reveal certain important structures. The corpus striatum proves to consist of two main masses of grey matter, the nucleus caudatus near the middle line, and the nucleus lenticularis externally. Bounded internally by the nucleus caudatus in front and the optic thalamus behind, and externally by the nucleus lenticularis, is a portion of white matter, called the *internal capsule*, which presents an anterior limb and a posterior limb, united at an obtuse angle forming a bend, called the *genu* or

knee of the capsule. The posterior limb of the internal capsule is now known to form the route by which motor impulses coming from the cerebral cortex pass downwards on their way to the crura cerebri, pons, medulla and spinal cord. Outside the nucleus lenticularis is another tract of white fibres, the external capsule, bounded externally by a stratum of grey matter, called the claustrum, while outside this, again, is the white matter abutting on the convolutions of the island of Reil.

Immediately posterior to the third ventricle, and beneath the posterior end of the corpus callosum, is the *pineal body*, and below the third ventricle, visible on the inferior aspect of the brain, is the *pituitary body*. Just behind and below the pineal body are the corpora quadrigemina, which are concerned with visual sensations and are the homologues of the optic lobes of lower vertebrates.

The *Cerebellum* consists of an elongated central lobe and two lateral hemispheres. The cerebellum is connected with adjoining structures by means of three pairs of peduncles, the superior peduncles pass upwards and inwards to the cerebrum, the inferior peduncles downwards and inwards to the medulla, and the middle peduncles communicate with the pons. The cerebellum, like the cerebrum, contains white matter internally, with an external grey cortex; in the latter are found peculiar ganglion cells, known as the cells of Purkinje.

The *Medulla oblongata* connects the brain with the spinal cord; just above the cord on the inferior aspect of the medulla is seen the pyramidal decussation, formed by the crossing over of medullated nerve fibres from the anterior pyramids of the medulla on their road to the lateral columns of the cord, the right and left anterior pyramids going to the left and right lateral columns respectively.

The central grey matter of the medulla is exposed on the upper surface by the opening up of the central canal of the cord into the fourth ventricle. In this grey matter lie important nerve nuclei, constituting the origin of cranial nerves from the fifth to the twelfth. Several outlying portions of grey matter are also found, the largest of which is known as the olivary body.

Functions of the Brain. THE CEREBRAL HEMISPHERES. The evidence with respect to the functions of these complex structures comes mainly from two sources—experiments upon lower animals and the study of disease in man. With regard to the former it is necessary to refer to the effects of removing the cerebral hemispheres, and to the evidence with respect to localisation of function derived from electrical stimulation of the cerebral cortex.

Removal of the hemispheres in a frog or pigeon reduces the animal to a kind of automaton; it is capable of performing complex movements in response to external stimuli, but if left undisturbed remains motionless and apparently devoid of all power of volition. In animals of higher development the shock produced by an operation of such magnitude is too great to admit of recovery. As regards electrical stimulation, Fritsch and Hitzig showed in 1870 that the application of a galvanic current to certain parts of the cortex of one side was followed by movements of the opposite side of the body. Their results have been extended by Ferrier and others, and the result of recent work has been to map out certain parts of the grey matter into areas, stimulation of which causes definite muscular movements. In the monkey's brain the motor centres of the cortex, as they are called, are situated on each side of the fissure of Rolando, on the convex surface of the hemisphere, the centres for the face lying lowest down, then those for the arm, and uppermost those of the leg; the muscles of the left-hand side of the body being represented in the right hemisphere, and *vice versa*. Further centres concerned with sight, hearing, taste, and smell, etc., have been described. To turn now to the teaching of disease in the human subject. Aphasia (q.v.) has long been associated with injury of a particular portion of the cerebral cortex, and it was noted from time to time that lesions of certain portions of the cortex were accompanied by palsies of definite muscles, or groups of muscles. Again, Dr. Hughlings Jackson traced certain convulsive phenomena to localised disease of grey matter (Jacksonian epilepsy). The two sets of facts, pathological and experimental, are found to be in the main confirmatory of one another, and by comparing the convolutions of the human brain with those of the monkey, and collecting the evidence obtained from post mortem examinations in man, it has been found possible to acquire a knowledge of cortical topography, which has been put to practical use in the treatment of disease. Of late years, in fact, it has been found possible, in several instances, to form an opinion as to the seat of the lesion from the symptoms of the patient, and the skull has been trephined and the mischief actually remedied by surgical treatment.

It must, of course, be remembered that only a comparatively small part of the cortex has been, so to speak, "used up" in this scheme of localisation. A large portion, for example, of the grey matter of the frontal lobes is apparently insensitive to electrical stimuli, and extensive disease of the frontal lobes has been noted without any ascertained associated defect.

The *Cerebellum* is probably concerned to a large extent with the co-ordination of muscular movements; thus tumours of the cerebellum are associated with a peculiar staggering gait, and removal of the cerebellum in animals causes marked incoordination.

The *Medulla*, besides serving as a link between the cord and brain, has most important relations with the respiratory and circulatory mechanisms. The whole brain above the medulla may be removed in animals, and respiration and life still continue, while, on the other hand, injury of a certain limited region in the medulla, which has been called the "nœud vital" (vital knot), produces instant death. Again, most important nerves originate in the medulla.

Diseases of the Brain. (For the results of violence *see* Head Injuries, for inflammation of the membranes of the brain *see* Meningitis.) Hydrocephalus, insanity, and certain general and functional cerebral diseases are treated of in separate articles, *e.g*

Chorea, Tetanus, Epilepsy, Headache, Hydrophobia, Alcoholism, etc., etc. It is necessary here to speak of the general symptoms pointing to disease of the brain, and of certain organic diseases, viz. Hæmorrhage, Softening, Abscess, Tumour. Brain-fever is a term used popularly to denote any disease in which delirium and fever are prominent symptoms.

Symptoms suggesting intracranial disease are:—Hemiplegia (q.v.), Convulsions (q.v.), Loss of consciousness and Apoplexy (q.v.), Headache (q.v.), Giddiness (q.v.), Delirium (q.v.), Aphasia (q.v.), Mental symptoms, Vomiting, and affections of cranial nerves, particularly Optic neuritis (q.v.); moreover, fever may be present, and certain characters of pulse and respiration (*see* Cheyne Stokes *On Breathing*) suggest cerebral mischief. It is important to note that some symptoms point merely to disease in some part of the brain, while others are of value in localising the actual seat of disease. Thus a diagnosis of cerebral tumour may rest on the presence of the three cardinal symptoms of that disease—headache, vomiting, and optic neuritis, while it may be further possible to indicate where the tumour is, from the associated aphasia, or hemiplegia, or convulsions, or in-coordination of movement, and so on, which may be also present.

Hæmorrhage. The most characteristic symptoms of this disease are sudden loss of consciousness with hemiplegia. [APOPLEXY.] The most common seat of hæmorrhage is the corpus striatum, but the cortex, pons, or other parts may be the site of the lesion. Hæmorrhage is much more common after 40 years of age than in younger subjects, and is particularly apt to be associated with granular disease of the kidney [BRIGHT'S DISEASE], gout, and alcoholism. The longer the initial unconsciousness is prolonged, the less, as a rule, is the chance of recovery, and if there is no sign of improvement after the lapse of twenty-four hours the case usually terminates fatally.

Softening of a portion of brain substance sometimes occurs from occlusion of a blood-vessel (usually an artery) and consequent interference with the circulation. The blocking of the artery may be due to the lodgment in it of a plug brought by the blood-stream from a distance, or to the formation of a clot *in situ*. The first condition is spoken of as Embolism (q.v.), the second as Thrombosis (q.v.). The most common cause of embolism is a diseased condition of the valves of the heart, particularly in the affections known as ulcerative endocarditis and mitral stenosis. A thrombus may originate from disease of the arterial wall. [ATHEROMA.] The symptoms of softening closely resemble those of hæmorrhage; the diagnosis between the two conditions is however often possible from an examination of the condition of the heart and blood-vessels. The term "softening" is popularly applied to almost any species of intracranial disease.

Abscess. A collection of pus in the substance of the brain is occasionally met with as the result of disease of the bones of the skull, particularly in association with ear disease. The possible supervention of this grave condition is one very adequate reason for treating with the greatest care all cases of "discharge from the ear." Aural mischief is too apt to follow after certain "children's diseases," and the importance of not making light of deafness and purulent discharge from the ear in such cases cannot be too forcibly insisted upon.

Tumour. New growths occasionally develop in the brain. The forms of most common occurrence are cheesy tubercular masses, syphilitic gummata and glioma (q.v.). Tubercle usually affects the cerebellum. The symptoms of intracranial tumour have already been briefly alluded to.

Brainerd, DAVID, missionary, was born in 1718 at Haddam, Connecticut. Licensed to preach in 1742, he went to convert the American Indians in Massachusetts, Pennsylvania, and New Jersey. The story of his labours is published in his *Wonders of God amongst the Indians* and *Grace Displayed*. He died in 1747 in the house of Jonathan Edwards, who subsequently became Brainerd's biographer.

Brake, a contrivance for controlling or diminishing the speed of a carriage, train, revolving cylinder, etc., by means of friction. Ordinarily we have a block of iron or hard wood pressing against the wheel tyres with force more or less regulated. The magnitude of the friction produced is very nearly proportional to the pressure applied, and levers are generally adopted to increase the applied force sufficiently. This force may be produced by hand, by atmospheric pressure as in vacuum-brakes, or by steam pressure as in the Westinghouse-brake. The chief applications of the brake are on trains, whose motion requires most careful control. A train brake must be automatic, or self-acting, *i.e.* if the train or part of it suddenly tends to increase its speed unduly, the necessary check should be applied mechanically, without requiring a man to apply it. Also it should be continuous, durable, simple in construction, and powerful. In the *chain-brake* the brake-blocks are kept apart from the carriage-wheels by a long continuous chain kept stretched by means of a drum on the brake van. If the chain is slackened by breaking, or by turning the drum, compressed springs force the blocks against the wheel tyres and the brake is in action. In the *vacuum-brake*, a continuous pipe extends along the length of the train. By means of an air-pump on the locomotive a vacuum is maintained in this pipe and in a series of brake-cylinders connected with each carriage. Each brake-cylinder contains a piston which, with vacuum-pressure on each side, will not move. When air is let in on one side by fracture of the pipe, or by giving it convenient entry, the piston moves and actuates the brake-blocks. The Westinghouse-brake, which is the best example of the pressure-brake type, is noticed separately.

Brama, a genus of acanthopterygian fishes allied to the Dolphins. There is but one species, *Brama raii* (Ray's bream), from 12 in. to 2 ft. long, deep blue above, silvery below. The body is much compressed, pectorals long and narrow, ventrals small, tail large and forked. It ranges from the

South Atlantic to the Mediterranean, and sometimes to the British coasts.

Bramah, JOSEPH, inventor, was born in 1748 at Stainborough, a village near Barnsley, Yorkshire. After serving his apprenticeship as a carpenter, he obtained employment in London as a cabinet maker, and was soon enabled, through his ingenious inventions, to start in business for himself. His inventions referred to safety-locks, water-closets, pumps, fire-engines, paper-making, etc., and in 1806 he patented a printing machine for numbering bank notes, which was adopted by the Bank of England. His main achievement was his Hydraulic Press (q.v.), which he patented in 1795. He died in 1814 at Pimlico.

Bramante, DONATO LAZZARI, architect, born in 1444 at Casteldurante in Urbino. He first studied painting, and though successful in this sphere abandoned it for architecture. About 1500 he went to Rome, where he was employed by Popes Alexander VI. and Julius II., for the latter of whom he planned the buildings connecting the Vatican with the Belvedere and designed the new church of St. Peter at Rome. He laid the foundation stone of St. Peter's in 1506, but did not live to see its completion, which was entrusted to Michael Angelo, who departed widely from his designs. He died in 1514 at Rome.

Brambanan, a ruined town of Java in the province of Surakarta, is celebrated for its remains of Hindu temples of hewn stone. Of these there are six groups, of which the most notable is the Chandi Sewu or "The Thousand Pagodas." There are also remains of edifices intended for residence and supposed to be monastic.

Bramble, the popular name for the various forms of the genus *Rubus*, constituting the species *R. fruticosus* of Linnæus. These all agree in having a shrubby stem, without the suckers familiar in the raspberry, leaves of three or five leaflets not arranged pinnately, and a black fruit. [BLACKBERRY.] They differ in the presence or absence of bristles and glandular hairs on the stem, the number, form and regularity of the prickles, the form of the leaf, the colour of the corolla, which is white or pink, the presence or absence of hairs on the calyx, its being green or white, the number, size and shade of the drupels in the fruit, the presence of a bloom on them, as in the Dewberry (q.v.), *Rubus cæsius*, the rounded or angular form of the stem, its rooting at its apex and such characters. The young shoots are very astringent, and are used, with the fruit, in preparing blackberry brandy, an effective rustic antidysenteric.

Brambling (*Fringilla montifringilla*), a finch widely distributed over the north of Europe and Asia, visiting Britain in the autumn and remaining till spring. The male is nearly 7 in. long; head, neck, and upper part of back mottled with black and brown in winter, changing to glossy black in spring; throat, breast, and wings fawn, the latter barred with black; belly and rump white; tail forked. These birds frequent stubble fields and in winter feed on mast. The call note is a monotonous chirp. Called also Bramble-finch and Mountain-finch.

Bramhall, JOHN, prelate, was born in 1594. Educated at Cambridge, he was in 1634 appointed Bishop of Derry, having gone to Ireland in 1633 as Wentworth's chaplain. He recovered large sums for the Church, and was very unpopular with the Catholics. In 1641 he had to flee to England, in 1644 to the Continent. At the Restoration he was raised to the archbishopric of Armagh, which he held till his death in 1663. He is chiefly known through his ineffective arguments against Hobbes on the questions of necessity and free will.

Branchia, the technical name for gills (q.v.).

Branchial Hearts are the expansions of the blood-vessels at the base of the gills; they are well seen in the common Cuttlefish (q.v.).

Branchiata, a synonym for CRUSTACEA, a term of value, as it emphasises the fact that this group breathes by gills, while the allied air-breathing ARACHNIDA and MYRIAPODA (centipedes, etc.), are grouped together as the Tracheata.

Branching, in the widest sense of the term, applies to the production of any lateral structures by any organ of a plant. Unicellular plants, such as yeast, branch by *gemmation*, each cell being capable of putting out other cells as lateral pouch-like outgrowths, which may either be entirely separated by constriction, or may remain united so as to give rise to a branching chain of cells. Some of the simpler "filamentous" algæ branch by producing *innovations*, one cell of the filament growing out laterally behind its junction with the next cell and outstripping that cell and undergoing cell-division. Such an innovation may become a new plant by the decay of its base of attachment. A similar mode of branching occurs in the far more highly organised stems of mosses. In *Characeæ* (q.v.) the large *apical cell* divides transversely, each alternately formed half being *nodal* or *internodal* respectively. The internodal cell divides parallel with its circumference, so as to form a *cortical layer;* and the production of both leaves and branches depends upon the outgrowth of certain cells in this cortical layer. Leaves in this group differ from branches mainly in their branching only proceeding to a limited extent. In the axes of the *Pteridophyta*, or ferns and their allies, and in the leaves in some case, branching is *chorisipodial* (Greek, *chorisis*, division; *pous, podos*, a foot or basis), resulting from the repeated division of a large apical cell by oblique cell-walls, very commonly three in number. In flowering-plants the one large apical cell is replaced by an apical *primary meristem* (q.v.), or group of small similar cells capable of forming new tissue by repeated divisions. The lateral branches of roots in this group originate *endogenously, i.e.* beneath the thick cortical tissue; those of leaves, *exogenously*, or from outer tissues, and *basipetally*, they being structures of limited growth with their apices formed first; and those of stems, exogenously and mainly *acropetally*, or from below upwards towards the apex whilst their growing

points or apical meristems are always protected by overlapping rudiments of leaves, forming a *bud* (q.v.). In arrangement (*caulotaxis* or *ramification*) the primary lateral branches of roots ("secondary roots" of many writers) are acropetal, all of them originating in the pericambium (q.v.) opposite the bundles of wood, which are limited in number, so that these branches occur in a limited number of vertical rows (*orthostichies*). Subsequently other roots are given off *adventitiously*, or in no definite order. Stems (as when they are pollarded or otherwise mechanically injured), and less commonly leaves, may also branch adventitiously; but the main branches of the stem of a flowering-plant normally produced, and consequently much of the general outline of the plant, owe their arrangement to that of the leaves. [PHYLLOTAXIS.] The stems of most monocotyledons, like those of ferns and cycads, are either unbranched or are chorisipodially dichotomous, as in *Aloë dichotoma;* but others, such as *Asparagus* and *Ruscus*, branch freely. In the *Coniferæ* the indefinite growth of the main stem or "leader" forms much more wood than the lateral branches, many of which may die off if the trees are crowded, leaving "knots" in the timber, and the tree, at least when young, acquires a conical outline. The primary branches, though apparently in whorls, are truly at slight different levels. In *Pinus* short twigs of definite growth bear each two, three, or five needle-leaves, and in the larches similar branchlets bearing tufts of leaves elongate after these leaves have fallen. In the honeysuckle several branches spring from the axil (q.v.) of a single leaf; but as a rule among dicotyledons only one does so, and the various methods of *gemmary*, or bud-produced, branching in this group are divided into two main types, the racemose and the cymose. *Racemose, indefinite, monopodial*, or *acropetal* branching, such as that of conifers, the flower-clusters of the grape-vine, or the wallflowers, cabbages, mignonettes, etc., consists in the continuous growth of a main axis by the partial unfolding of a terminal bud and the successive development of lateral buds from below upwards. If the main axis branches once only, it is *simple;* if more than once, *compound*. [RACEME.] *Cymose, definite, polychasial* or *centrifugal* branching consists in the unfolding of the terminal bud of a stem into a flower or some other early termination to the growth of main axis, which is thus definite, its growth being continued by lateral axes that overt of it, so that "the stem is lost in its branches," and many axes, or chasia, are produced from the centre outwards. Such branching may be *multilateral*, two (dichasium) or three (trichasium) lateral branches of equal vigour being produced, as in *Stellaria, Cerastium*, or *Datura;* or it may be *unilateral* and *sympodial*, one branch at each forking being more strongly developed than the other, whilst the primary axis and its successive stronger-growing lateral axes, secondary, tertiary, etc., form a *pseudaxis* or *sympodium*. Unilaterally cymose branching may be either *cicinnal*, where the stronger branch originates first to one side of the direction of the main axis, and then alternately to the other, or *bostrychoid*, where the stronger branches form a spiral round the main direction or pseudaxis, as in the inflorescence of *Hemerocallis*. Chorisipodial branching is similarly either *polytomous*, as in the stem of *Marchantia* or the stamens of *Ricinus*, or unilateral and sympodial; and in the latter case it is either cicinnal or *scorpioid*, as in *Selaginella*, or bostrychoid or helicoid, as in the fronds of *Adiantum pedatum* or other pedate leaves, such as those of the Christmas rose (*Helleborus niger*). [INFLORESCENCE, CYME, RACEME, BOSTRYX, CICINNUS, etc.]

Branchiogastropoda, those Gastropoda which breathe by gills.

Branchiopoda (*i.e.* gill-footed), a subdivision of the ENTOMOSTRACA, including the CLADOCERA, PHYLLOPODA, and TRILOBITA; the characters possessed in common by these three orders are that the gills are borne on the legs, and that some at least of the legs are flattened out to serve as gills.

Branchipus, one of the best known genera of the PHYLLOPODA; it is common in the lakes and ponds of Germany.

Branchiura, a sub-order of COPEPODA including the family *Argulidæ*, the members of which are parasitic on carp, etc.

Branco, RIO, a river of N. Brazil and an affluent of the Rio Negro, has its sources near the borders in Venezuela in the Parima Mountains.

Brand (Ger. *brennen*, to burn), a mark usually produced by fire. Herring casks are branded, under Government inspection, if the owners desire, to certify the quality of the fish. Each separate consignment in a ship's cargo, if packed in cases, bags, or barrels, has usually its special brand, consisting of letters and geometrical figures variously arranged, to facilitate identification. Horses and cattle are often branded when kept in large herds (a practice customary in Greece, at least, as far back as the 5th century B.C.). Criminals have very frequently been branded, and deserters from the British army were branded with the letter D till 1879. The name is also (especially in America) applied to any trade mark, whether burnt-in or not.

Brand, JOHN, antiquary, was born in 1744 at Durham. After graduating at Oxford, whither friends had sent him, he was in 1777 elected a fellow of the Society of Antiquaries, and in 1784 presented to the rectory of the united parishes of St. Mary-at-Hill and St. Mary Hubbard in the City of London. In the same year he was elected resident secretary to the Society of Antiquaries, an office that he held till his death, 1806. His *Observations on Popular Antiquities* is regarded as the leading book on this subject in the English language.

Brande, WILLIAM THOMAS, chemist, was born in 1788 at London. After studying medicine he sent a communication in 1806 to the Royal Society, which was published in their *Transactions*, and in 1809 he was elected a Fellow and became Sir

Humphry Davy's assistant at the Royal Institution, succeeding Davy in 1813. In 1825 he was made superintendent of the die department in the mint. From 1816 to 1836 he was conjointly with Faraday editor of the *Quarterly Journal of Science and Art*; he also published a *Manual of Chemistry* and other works. He died in 1866.

Brandenburg, one of the largest provinces of Prussia, covering an area of 15,500 square miles. Its boundaries are on the north, Mecklenburg and the province of Pomerania; east, Posen and Silesia; south, Silesia and the kingdom of Saxony; and west, Anhalt and the provinces of Saxony and Hanover. For the most part it is a sandy plain, with here and there fertile districts and woodland. Its chief town is Berlin, and among its other leading towns are Potsdam, Frankfort, Brandenburg, etc. It is watered by the Elbe, the Oder, the Havel, and the Spree, with their numerous tributaries and canals. Besides agriculture and cattle raising, the inhabitants engage in the manufacture of silks, cotton, wool, paper, brandy-distilling, and its mineral products embrace coal, limestone, gypsum, etc. The province is divided into the governments of Potsdam and Frankfort, Berlin forming an independent jurisdiction, and its inhabitants are mainly Lutherans. Its connection with the Prussian monarchy dates from the time of Frederick I., Elector of Brandenburg. [PRUSSIA.]

Brandenburg, a Prussian town in the province of Brandenburg and government of Potsdam, is on the river Havel and the Magdeburg and Berlin Railway. It is encompassed by walls and divided by the river into the old and new town, between which, on an island in the river, is the "cathedral town," called also "Venice," with buildings of antiquarian interest and works of art. The town has a brisk trade and manufactures in woollens, linen, silks, hosiery, boat-building, leather, breweries, etc.

Brandling, BRANLING, local Irish names for the Parr (q.v.).

Brandon, a town of England in the county of Suffolk, is situated on the Little Ouse or Brandon river, and is the centre of the manufacture of gun-flints. Despite the introduction of percussion caps, flint-lock guns are still exported to Africa.

Brandt, SEBASTIAN, author, was born in 1458 at Strasburg. After studying at Basel, he became one of the leading lecturers there, and the Emperor Maximilian appointed him one of his councillors. He is famous as the author of the *Narrenschiff*, or *Ship of Fools*, one of the most popular books of the time. It has been translated into all the languages of Europe. Brandt died at Strasburg in 1521.

Brandy. An alcoholic liquor obtained by the distillation of wine. The taste and colour vary in brandies from different localities, owing to differences in the soil and methods of preparation. It generally contains from 45 to 55 per cent. of alcohol, in addition to which are small quantities of acetic acid, tannin, colouring matter, and volatile oils.

Brandywine Creek, a small river of America, rises in Pennsylvania and after flowing through Delaware state joins the Christiana creek at Wilmington. It is interesting as giving the name to a battle fought on its banks on September 11, 1777, between the British and Americans, in which the British were victorious.

Brank, a sort of gag or bridle, once usual as a punishment for female scolds in Scotland and the North of England. Its use lasted on here and there till the 19th century.

Brant, JOSEPH, Indian chief, was born about the middle of the 18th century. He proved a valuable ally to the British in their American wars both with the red-men and the colonists. Subsequently he became a devout Christian, and translated St. Mark's Gospel and the Prayer Book of the English Church into Mohawk. He also visited England in 1786 to raise funds to build the first Episcopal church in Canada. A monument to his memory was erected at Brantford, Ontario. He died in 1807.

Brantome, PIERRE DE BOURDEILLES, SEIGNEUR DE, historian, was born about 1540 in Gascony. After some experience in arms he retired, after Charles IX.'s death, from active life and devoted himself to the writing of his *Mémoires* of the celebrated men and women he had met. Brantome died in 1614.

Brash. [WATERBRASH, PYROSIS.]

Brasidas, Spartan general, signalised himself in the Peloponnesian war. Among his chief exploits were the relief of Megara in 424 B.C., his expeditions through Thessaly to Macedonia in the same year, and his defence of Amphipolis on the Strymon in 422 against Cleon and the flower of the Athenian army. Though victor, he was mortally wounded, and buried within the walls of the city.

Brass. Any alloy of which copper and zinc are the chief constituents, but the name is frequently confined to the varieties possessing a yellow colour. It is harder than copper, is ductile, malleable, susceptible of a fine polish, and can be obtained of any shade of colour from white to orange red. It is eminently adapted for ornamental metal work, and the metal portions of scientific instruments.

Brasses, engraved sepulchral tablets usually made of a fine kind of mixed metal called latten, and inlaid on slabs of stone, in a hollow called the matrix, made to receive them, either as part of the pavement of a church, or on altar tombs. Commonly they contain figures, sometimes crosses and decorative patterns, and sometimes inscriptions only. Occasionally parts of the engraved work are filled up with enamel. The oldest in England is that of Sir John d'Abernon, at Stoke d'Abernon in Surrey, dated 1277. One a little later in date exists near Cambridge. They are specially valuable as illustrations of mediæval costume. Though England possesses the best and most numerous examples

extant, they are usually of foreign, probably French and Flemish, workmanship.

Brassey, THOMAS, railway contractor, was born in 1805 at Buerton, Cheshire. Apprenticed to a surveyor at 16, he acquired his master's business on the latter's death, and his first engagement as a railway contractor came in 1835, when he undertook the execution of the Penkridge Viaduct on the Grand Junction Railway. He next had the completion of the London and Southampton Railway. His subsequent operations extended to most European countries, to India, Australia, and America. He laid down the Grand Trunk Railway of Canada with its remarkable bridge crossing the St. Lawrence at Montreal. He died in 1870 at St. Leonards, leaving a large fortune. His son, Thomas, now Lord, Brassey was born in 1836, and from 1880 to 1884 was a lord of the Admiralty. His wife, who died in 1888, wrote *The Voyage of the Sunbeam.*

Brassica, a genus of the order *Cruciferæ*, having conduplicate cotyledons and a beaked apex to its siliqua, and including about 100 species. It includes a large number of useful plants, many of which are but long cultivated races of a small number of wild species. *B. oleracea*, the cabbage, a biennial sea-side plant with glaucous fleshy undulate leaves, is not only the parent form of all the various kales, broccoli, kohl-rabi, etc., but possibly also of *B. campestris*, which includes *B. rapa*, the turnip, *B. napus*, the rape or colza, and the apparently hybrid swede (*B. campestris* var. *Napobrassica*). The sub-genus *Sinapis*, with sepals spreading instead of erect, includes *B. nigra*, black mustard, and *B. alba*, white mustard, British species, the crushed seeds of which yield the pungent "flour of mustard," whilst the young seedlings of the latter species are eaten with those of cress as a salad. *B. juncea*, a native of India yielding mustard-seed oil or "soorsa," largely used in Russia instead of olive-oil, and many other species employed in other countries. [CABBAGE, MUSTARD.]

Brathwaite, RICHARD, poet, was born about 1588 in Westmoreland. After studying at Oxford and Cambridge, he removed to London, and in 1611 published his first collection of poems under the title of *The Golden Fleece.* This was followed in 1614 by three other works, and in 1615 by some satires. His most famous production, however, appeared in 1638, viz. *Barnabae Itinerarium*—a record of English travel in English and Latin doggerel verse. He died in 1673.

Braun, AUGUST EMIL, archæologist, was born in 1809 at Gotha, Germany. After studying at Göttingen and Munich he went in 1833 to Rome, where he was appointed librarian and subsequently secretary of the Archæological Institute. His works, which were written in English, German, and Italian, are numerous and highly valuable to archæology and art. He died in 1856 at Rome.

Braunsberg, a town of Prussia and capital of a circle in the government of Königsberg, is situated near the mouth of the Passarge in the Frische Haff. It is the seat of the bishop of Ermeland and has various educational institutions. Its industries embrace woollens, linens, tanning, etc., and it has a considerable trade in ship-timber, corn, and yarn. Till 1632 it was held by the Swedes.

Bravura, in *Music*, an air containing florid passages, requiring force, spirit, and skill in its execution.

Brawling, the offence of quarrelling or making a disturbance in the church or its appurtenances, and it was formerly punishable by cutting off the offender's ears. By a statute passed during the reign of Victoria—24 and 25 Vic., c. 32—the jurisdiction of the ecclesiastical courts in England and Ireland in suits for brawling was abolished as against persons not in holy orders; and persons guilty of riotous, violent, or indecent behaviour in churches and chapels of the Church of England or Ireland, or in any chapel of any religious denomination, or in England in any place of religious worship duly certified under the provisions of 18 and 19 Vic., c. 81, or in church porches or burial grounds, on conviction before two justices were made liable to a penalty of not more than £5 or imprisonment for any term not exceeding two months.

Brawn, the flesh of a pig's head and feet, or of an ox's feet, chopped small, boiled together and pickled.

Bray, a fashionable watering place in Ireland, is pleasantly situated on both sides of the river Bray, which here separates the counties of Wicklow and Dublin. It is a neatly built town with several public institutions and a small harbour, and manufactures in woollens and linens.

Bray, a parish of England, in the county of Berkshire, is famous as the abode of the *Vicar of Bray*, well known through the ballad. According to it the vicar retained his living in the reigns of Charles II., James II., William III., Anne, and George I., by changing his faith to suit the changing circumstances of the times.

Bray, ANNA ELIZA, authoress, was born in 1790, in London. Her maiden name was Kempe, but in 1825 she married the vicar of Tavistock, the Rev. E. A. Bray. Her works, which are numerous, embrace historical romances, travels, etc., and among them the most valuable is *The Borders of the Tamar and the Tary*, describing in the form of letters to Southey the legends and superstitions surrounding the town of Tavistock. Mrs. Bray died in 1883, in London.

Bray, THOMAS, divine, was born in 1656, at Marton, Salop. After studying at Oxford, he was appointed vicar of Over-Whitacre and rector of Sheldon. He was sent by Bishop Compton to Maryland to arrange the affairs of the church there, and exerted himself in colonial missions and in the establishing of parochial libraries, out of which grew the Society for Promoting Christian Knowledge. The Society for the Propagation of the Gospel also owes its existence to his labours. On returning to England in 1706 he received the living of St. Botolph Without, Aldgate. He died in 1730.

Brayera Anthelmintica. The female inflorescence of an Abyssinian plant of this name is employed as a vermicide. [CUSSO.]

Brazil, the largest state in South America, extending from lat. 5° N. to 33° S., and from long. 35° to 74° W., with a length of 2,660 miles, and a breadth of 2,500 to 2,600, an area of close on 3¼ millions of square miles, and a coast-line of nearly 4,000 miles. For a comparison of size it may be remarked that Brazil is very little smaller than Europe. It is in great part both unsettled and unexplored, and lying almost entirely within the tropics, presents the ordinary features of tropical climate, scenery, and productions, both animal and vegetable, varied somewhat by the formation of the land. Brazil consists of a table-land in the east and centre, with low-lying plains and river valleys to the north and north-west and the south and south-west. There are three great river systems, that of the Amazon, which with its tributaries occupies the northern and north-western portion of the country, that of the Parana and the Paraguay to the south and south-west, and that of the San Francisco, which has its source and follows its course among the table-lands of the east, and forces its way through the mountains into the Atlantic. The great northern plain is so level that the Amazon at a distance of 1,500 miles from the sea is only 250 feet above sea level, and the feeders of the Amazon and Orinoco not only join, but direct navigation from the ocean to the ocean by means of these two rivers is possible. The interior of the country is a series of lofty plateaux, broken and intersected by river valleys. The upper coast consists of low lands and sandy plains, and the southern extremity of rolling land ending in low sandy coast. The plateau land begins from the parallel of San Roque (lat. 5° S.) and extends southward and westward till it is lost in the great plain of the Amazons, which extends to the foot of the Andes in the west, and to the rising land towards Venezuela in the north.

The mass of the table-land is not central. The two principal ranges of heights, from which many others radiate, are the Serra da Mantaqueira, and the Serra do Espinhaço, extending from lat. 18° to 23° S., and situated from the east coast at distances varying from 100 to 200 miles. The highest point in this range is the Pico do Itatiaiossu, the height of which is variously estimated at from six to ten thousand feet. One effect of this range is to turn the course of the rivers inwards in the direction of the Amazon and the Plata, and so to render intercourse between the coast and the interior difficult. One range of high plateaux, with different names in different parts, forms a watershed between the north and south rivers. The highest part of this is the Monte Pyreneos in Goyaz, between the basins of the Tocantins and the Paramhyba, and it rises to a height of 9,000 feet.

The climate varies from an unhealthy humidity in some of the lower parts of the coasts, and in the great river valleys which are rank with vegetation, and are kept almost perpetually moist by the east winds which come laden with vapour from the Atlantic, to a healthy dryness upon the breezy uplands; and while the northern parts have the alternate and regularly recurring wet and dry seasons of the tropics, the table-lands have four distinctly marked seasons, although they are not exactly similar to those of Europe.

The vegetation of the vast forests in the Amazon and other river valleys is of great variety and luxuriance. Most people are acquainted from books of travel with the extensive virgin forests, with their variety of trees, festooned and bound together by lianas in such a way as to make progress through them a matter of difficulty and well nigh impossibility. Of the trees used in commerce the chief are, perhaps, the rosewood, the Brazil-wood, and other dye-woods, and the rubber tree.

The fauna of Brazil is no less varied than its flora. The jaguar, puma, tiger-cat, ocelot, monkey, tapir, capybara, peccary, ant-eater, and sloth abound; the woods are full of boa-constrictors and other snakes; the air is bright with parrots, humming birds, butterflies, and wild bees, and other insects—among them the cactus-loving cochineal insect—while the Amazons and other rivers teem with alligators, turtles, porpoises, manatees, and many ther fish, among them the pira.

The population of Brazil was, according to the 1900 census, over 17 millions, exclusive of about one million wild Indians. A gradual emancipation of slaves was begun in 1871 and various measures were introduced in the same direction down to 1888, when final and full emancipation was decreed, and this act has not been followed by the same disastrous effects that followed sudden emancipation in the West Indies.

The general religion of the country is Catholicism, though other religions are tolerated, and since the last revolution there is no State religion. Till lately the country was governed by an emperor, aided by a cabinet, and a legislature, consisting of a senate and a chamber of deputies; but in November, 1889, in a quiet business-like way, a republic was decreed, and in February, 1891, a new constitution was inaugurated, based upon that of the United States, the president's term of office being fixed at four years. There was little excitement about the revolution, things went on as usual, most imperial officials simply changed their names, and the only important changes were that Church and State were separated, civil marriages were made the rule, and education was popularised.

At present the public debt of Brazil is about £131,000,000, and there is £26,000,000 of revenue as against £28,000,000 of expenditure.

The commerce of Brazil is not very considerable owing to a variety of causes, one of which is an excessive system of protection. Her chief exports, beyond the produce of the forest in the shape of dye- and other woods, are coffee, sugar, cotton (which is of fine quality and grows well on the dry table-lands, but is not well worked), tobacco, cocoa, rice, and tapioca, which is prepared from the manioc or cassava.

But Brazil is an altogether undeveloped country. It produces diamonds, and other precious stones in

great varieties, coal, sulphur, gold, silver, copper, and iron, and doubtless has a great future before it.

Brazil-nut, the seed of *Bertholletia* (q.v.) *excelsa*, a native of north-eastern South America. The seeds are closely packed, 18 to 24 together, in the spheroidal woody capsular fruit, which is about six inches in diameter. The testa is brown, woody, and wrinkled and wedge-shaped, and the tegmen resembles the testa of many other seeds. The nuts are rich in a bland oil, known in Brazil as Castanha oil, and used by artists and watchmakers. They form an important article of export from Para, being used not only as a dessert fruit, but now very largely in soap-making.

Brazil-wood, the wood of *Cæsalpinia echinata* and allied species, imported in considerable quantity as a source of red dyes. *C. echinata* is a Brazilian tree with prickly branches, bi-pinnate leaves, with elliptical-acute leaflets, racemes of yellow flowers and spinous pods. It is probably the Bresil de St. Martha, the source of the valuable Lima wood, the less valuable Nicaragua wood or Peach-wood. *C. crista*, a native of the West Indies, is another source of Brazil-wood and of Bahama Braziletto wood. *Peltophorum Linnæi*, formerly known as *C. brasiliensis*, a native of Jamaica and San Domingo, is the source of Braziletto-wood, used as an orange dye and for violin bows and other small articles of turnery.

Brazing, the soldering together of iron, copper, or brass with an alloy of brass and zinc.

Brazos, a river of America, rises in the N.W. of Texas, and flowing for upwards of 900 miles in a S.E. direction, debouches into the Gulf of Mexico.

Brazza, an island in the Adriatic, belongs to Dalmatia. It is mountainous and well-wooded, yielding marble, wines, oils, etc. Its area is 160 square miles. Chief town, San Pietro.

Brazza, PIERRE SAVORGNAN DE, explorer, was born in 1852, at Rome. After studying at Paris, he entered the French navy in 1870. In 1878 he was subsidised by the Government to explore the country north of the Congo, where he acquired grants of land for France, and established stations. In 1883 he returned to the Congo again, and extended still further the interests of France there. In 1886 he was made governor of the French dependency between Gaboon and the Congo—territory that he himself had been instrumental in acquiring.

Breach. 1. A gap, hole, or rent in a fortification, caused by battering guns or by mining. The object is to create an opening in the fortress for a storming party. 2. A violation or dereliction of duty or obligation. The following are the more important instances: (1) breach of contract; (2) breach of promise of marriage; (3) breach of the peace; (4) breach of trust; (5) breach of privilege. (*See* the various titles.)

Breaching Tower, in the Middle Ages, the English name for the French *beffroi*, a movable tower of wood, covered with leather and mounted on four wheels, containing six or seven storeys. A battering ram was sometimes mounted on one of the lower storeys, while the upper contained slingers and archers to cover its advance or prevent defence of the wall. Froissart describes such towers, which were a legacy from the classical period.

Bread is the article of food formed by baking the dough, or paste, made by the mixture of flour or grain with water. The primitive method consisted in simply this and nothing more, but now the kneaded mass of dough is universally brought to a spongy texture, the change being due to the formation of carbonic acid in the mass, and is brought about in three ways:—(1) by the action of some ferment such as leaven or yeast; (2) by the addition of an acid (such as tartaric) and sodium bicarbonate; (3) by directly injecting the gas. The mechanical result in each case is the formation of innumerable cells within the dough, the whole being encased within the crust formed during the baking. The cereals from which bread is made may, for dietetic purposes, be said to contain constituents of the three following main groups:—(1) Carbohydrates, *i.e.* the starches, sugars, and gums; (2) albuminoids or nitrogenous matters; (3) ash, or mineral matters. The chief proteid present is gluten, a nitrogenous substance mixed with another called "gliadin," which latter gives the characteristic adhesiveness to dough. In the first of the three processes mentioned above, the addition of the ferment partially converts the starch into maltose, which with the sugar becomes converted into carbonic acid and other products. When the fermenting process has gone on far enough, the dough is placed in the oven, where the heat soon stops the action of the ferment; the mass, however, keeps on expanding until the formation of the outer crust. In method (3) the flour is mixed under pressure with water charged with carbonic acid, and the resulting dough, on the removal of the pressure, becomes vesicular or spongy, and is then divided into loaves and baked.

Bread-fruit, *Artocarpus incisa*, a native of the South Sea Islands, is a most valuable tree forming the type of the order *Artocarpaceæ*. The soft timber and fibrous bark are employed, and the latex containing caoutchouc is used as glue and for caulking boats. The leaves are large, dark-green, and lobed like those of its ally the fig, and they have large convolute stipules. The male flowers are in long club-shaped spikes, and the pistil-bearing ones in round heads. Each ovary is one-chambered and one-ovuled with two stigmatic lobes; but the whole female inflorescence, as in the allied mulberry, gives rise to one "fruit" or infrutescence, of large size, green externally, but white and farinaceous within. The best varieties have no seeds, but are propagated by suckers. The fruit is roasted or baked for food, and forms the chief diet in the South Seas. The bread-fruit was introduced into the West Indies by H.M.S. *Bounty*, after Captain Cook's voyages of exploration.

Breaking-stress, in *Engineering*, means the load per unit of area that will cause fracture of any given material. Thus the breaking-stress of

wrought-iron in tension is the load that would break a bar of that material one square inch in section, if hung on at the end so as to extend the bar. The load must be applied without jerk.

Breakwater, a barrier in front of a harbour or anchorage, mainly for the protection of shipping. It may be of natural or of artificial formation, or advantage may be taken in its construction of natural partial barriers that exist. Breakwaters are of most importance where the harbours are much used, and where the position is exposed to heavy storms, as at Plymouth, Holyhead, Portland, or Cherbourg. The material employed varies with the locality. If good stone can be quarried in the neighbourhood, the breakwater is generally built of that material. Thus at Plymouth large blocks of limestone were quarried near, shipped, and dropped down as rubble in the required position; and at Holyhead the stone was cut from the Holyhead mountain, and run out to the sea on timber staging. In places where stone cannot be readily obtained, blocks of concrete have been satisfactorily employed instead. Usually the stone available is first deposited irregularly in a long mound as rubble, with a base of considerably greater width than the top. This mound is faced with masonry or concrete, to diminish the effect of the action of the waves. In some cases little more than a firmly built paving exists above the facing, as in the breakwaters at Plymouth and Cherbourg; but the rubble is often surmounted by a masonry wall, as at Portland and Holyhead. Where the breakwater is composed of concrete blocks, it is usual to build it up from the bottom as a wall with outwardly sloping faces, like that at Dover, where no stone is available in the neighbourhood. The depth of water on the site of the structure varies considerably in different cases, but rarely exceeds 100 feet; at Portland the water is about 50 feet deep at low-water spring tide, at Cherbourg about 60 feet. At Alderney the depth at the outer end of the breakwater is 130 feet, but the difficulties of building and maintaining this outer portion have been so great that the original design of 1847 has not yet been carried out. Fuller accounts of the more important breakwaters are noticed separately. [CHERBOURG, DOVER, HOLYHEAD, PLYMOUTH, PORTLAND.]

Bream, any fish of the freshwater genus *Abramis*, of the carp family, found in the north temperate zones of both hemispheres. Two species are British: *A. brama* (the Common Bream) and *A. blicca* (the White Bream). The former is usually from 1 ft. to 2 ft. in length, with a weight of from two to four pounds, but much larger specimens occur. In colour it is yellowish-white, growing darker with age. This fish affords excellent sport, but the flesh is somewhat insipid. The latter species is rarely more than a foot long, silvery-white with a bluish tinge. Both feed on water-plants, worms, and insects. The so-called Pomeranian Bream is probably a hybrid between the Common Bream and the Roach.

Breast, or mammary gland, is the organ concerned in secreting milk. The gland substance proper is surrounded by connective tissue and fat, which forms a kind of packing and supporting material. The gland itself is made up of a number of lobes, each lobe being further divided into lobules. These lobules are found on microscopical examination to be composed of a number of acini or hollow sacs lined by cubical epithelial cells which all open into a common duct. By the union of such lobular ducts, the main ducts of the gland, the lactiferous or galactophorous ducts, are formed; these are about fifteen in number and, radiating towards the nipple, open by separate orifices upon it. Just before reaching the surface each main duct presents a dilatation, a sort of reservoir for the accumulation of the secretion. The nipple contains in addition to these terminations of the ducts a supporting framework of areolar tissue, unstriped muscle fibres, and numerous blood-vessels. It is surrounded by an areola of pink or brownish skin. In the female at the time of puberty the breasts enlarge; during pregnancy further development occurs, and culminates ultimately in profuse secretion of milk after childbirth.

Diseases of the Breast. When the secretion of milk is first established certain troubles in connection with the nipple occasionally present themselves. It may be that the nipple is too short or that it is in some other way malformed. Such conditions usually yield to treatment with the breast pump. Cracks and fissures of the nipple are not infrequent sources of much discomfort, especially when suckling a first child. Scrupulous cleanliness, combined with the application of oxide of zinc, or of astringent lotions, and the use of a shield, are the measures adopted in such cases. *Mammary abscess* is apt to occur in connection with suckling, and may give rise to considerable constitutional disturbance. Treatment consists in evacuating the matter by a free incision radiating outwards from the nipple. Chronic abscesses sometimes simulate tumours. Chronic induration, too, of parts of the mammary gland may occur and cause considerable apprehension to the patient, and yet completely yield under treatment without any recourse to an operation. Many forms of new growth have been met with in the mammary gland. *Adenoma* or mammary glandular tumour presents itself, as a rule, in young adults, and does not recur after removal. *Sero-cystic tumour* is another form of disease sometimes met with. The most dreaded form of diseases of the female breast is hard cancer or *scirrhus mammæ*. It very rarely occurs under thirty years of age, and in most cases patients are between forty and fifty. A nodule of stony hardness is felt in one breast, shooting pains are experienced in relation with it, and if the disease is allowed to progress unchecked, the cancerous growth rapidly extends, involves the glands of the armpit, and renders vain all hope of cure from operative treatment. Removal of the growth in its earliest stage is urgently indicated, and hence the importance of consulting a medical man if there be even a suspicion of any trouble in connection with the breast.

Breastplate, in ancient and mediæval warfare, a plate of metal, usually brass or iron, protecting the breast of the wearer.

Breastwork, a hastily constructed fortification thrown up to afford cover to infantry in the field, and reaching about breast high, so that they can fire over it.

Breath, OFFENSIVE. This is due, as a rule, to some local mischief in the mouth, throat or nasal passages. If the last-named be at fault, the condition is called Ozæna (q.v.). If the breath exhaled from the mouth itself be offensive, the teeth and throat should fall under suspicion. Digestive troubles, too, may exist, and cause the mischief; and in exceptional cases the source of trouble may be in the lungs.

Breathing. [RESPIRATION.]

Breccia (Ital. *débris of broken walls*), in *Geology*, a rock consisting of angular fragments of various stones and occasionally bones cemented together by some other material (*e.g.* lime). It is contrasted with conglomerate, in which the stones are rounded. Both are known under the generic name of "pudding-stone."

Brechin, a Scottish borough, in the county of Forfarshire, is situated on the south Esk. It is an old town and has a cathedral, which now serves as the parish church, dating from the 12th century. Near the cathedral is a round tower, similar to those so common in Ireland and to the one at Abernethy, the only other example in Scotland. Brechin castle is the seat of Lord Dalhousie and stands a little to the south of the town. There are linen and paper manufactures, distilling, and brewing. Dr. Guthrie, the celebrated preacher, was a native of Brechin.

Breckinridge, JOHN CABELL, United States vice-president, was born in 1821, near Lexington, Kentucky. After practising law, he served as a volunteer in the Mexican war, sat in Congress from 1851 to 1855, became vice-president in 1856 under Buchanan, stood as an opponent of Lincoln, on the slave question, for the presidency, and after fighting in the Confederate army, and being secretary for war in Jefferson Davis's government, fled in 1868 to Europe. He died in 1875 at Lexington.

Brecknock, or BRECON, a Welsh town, the capital of Brecknockshire, is situated at the junction of the rivers Usk, Honddu and Tarell. It lies in a valley amongst the finest mountain scenery of South Wales. It is an old town, dating from the time of the Conqueror, and used to be surrounded by a wall. In its vicinity are fine Roman remains. Its manufactures embrace iron work and textile fabrics. Mrs. Siddons and Charles Kemble were natives of Brecknock. Pop. (1901), 5,875.

Brecknockshire, or BRECON, is an inland county of South Wales, covering an area of 719 square miles, and is thus the fourth largest county in Wales. Though it is the most mountainous county in the principality it is considerably under cultivation or pasture, and yields, besides the ordinary grain crops, hops, fruit, cattle, butter and wool. Its chief rivers are the Wye, Usk, Yrfon, Elan, Claerwen and Tawe; and amongst its lakes is Breckinioc Mere, the largest in South Wales. The principal towns are, besides Brecknock, the capital, Crickhowell and Builth. In the S.E. are extensive ironworks, and among its manufactures are woollens and hosiery. The prevailing language of the inhabitants is Welsh. Brecknockshire formed part of the territory of the Silures, famed for their stubborn resistance to the Romans, and it was in this county that Llewelyn, the last British Prince of Wales, was defeated and slain. Pop. (1901), 53,951.

Breda, a fortified town of Holland, in the province of N. Brabant, is situated at the junction of the Merk and the Aa. Its defences may be strengthened by flooding the surrounding country. It is a Catholic bishop's see and has a Gothic cathedral. Its castle, built in 1350, was for a time the residence of the exiled Charles II. of England, and from Breda he issued his declaration, promising liberty of conscience and a general pardon on his restoration. Breda is rich in historical associations. It has manufactures of linens, woollens, carpets, hats, leather, etc.

Brederode, HENRY, COUNT OF, was born in 1531 at Brussels. He led the malcontent nobles against Spain and was the author of the "Compromise of Breda" of 1566. He was latterly obliged to seek refuge in Germany, where he died in 1568 at Recklinghausen.

Bree, MATTHIAS IGNATIUS VAN, painter, was born in 1773 at Antwerp. His *Death of Cato* won for him the Prix de Rome. On his return to his native town in 1814 he was appointed director of the Academy of Fine Arts. His most noted picture is *Patriotism of the Burgomaster at the Siege of Leyden, 1576*, representing the Burgomaster Van der Werff offering the starving populace his body to be shared amongst them.

Breeches Bible, so called from the rendering "breeches" (replaced in the Authorised Version by "aprons") in Genesis iii. 7. It was a translation of the whole Bible into English produced in 1560 by the English exiles who took refuge at Geneva in the reign of Queen Mary.

Breechloader, any firearm, great or small, the charge of which is admitted into the barrel at the rear and not at the forward end. The majority of modern rifles, sporting guns, machine-guns, quick-firing guns, and heavy guns are breechloaders. Breechloaders are not a modern invention. The British Government possesses a breech-loading forged iron patararo of about 1470, which is of about 2½ in. calibre, and weighs 125 lbs.; and Lord Nelson possessed a breechloading pistol. The first breechloading rifle introduced to the British service was the Snider, which was adopted in 1864; but the German army had used a breechloader, the famous needle gun, the invention of Dreyse in 1829, since 1848, and certain troops were armed with it as early as 1841. Heavy breechloading guns did not come into favour until after the Crimean war. [ORDNANCE, RIFLE, REVOLVER, QUICK-FIRING GUN, etc.]

Breed, a race or sub-variety of animals capable of transmitting their distinctive characteristics to

their offspring. Some breeds have arisen from what are called "freaks of nature," or pathological variations. Of these the now lost Ancon sheep, the Mauchamp sheep, and turnspit dog [*see* these articles] are examples. Others, as the "Wood Buffalo"—a breed of bisons now extinct—were due to natural causes, uninfluenced by man. The artificial formation of breeds dates back to the time when man first reduced to subjection the progenitors of what are now our most useful domestic animals. When this process began no one can tell, but it must have been at a very early period of our race—as soon, indeed, as the wandering life of a hunter was exchanged for that of a nomadic herdsman. Then by degrees would come into operation the principle which Darwin calls *Unconscious Selection*. The pick of the herd would be chosen for sires and dams, and by the survival of the fittest the weakest of the offspring would be weeded out. This process, carried on through successive generations, would give rise to a race in which may be discerned the analogue of our modern breeds. The next step would be the reduction of this unconscious selection to some sort of system. Probably the earliest recorded instance of any attempt to bring man's influence to bear on the result of coupling domestic animals is found in Gen. xxx. 37–42. In Lev. xix. 19 there is a direct prohibition of the practice of producing hybrids; and though mules were common among the Jews, these animals were bred and sold to them by their neighbours. Youatt examined all the references to breeding in the Hebrew Scriptures, and came to the conclusion that "at that early period some of the best principles must have been steadily and long pursued." Allusions will be found in Homer to the necessity of choosing good sires; and the third *Georgic* of Virgil might be appropriately entitled "A Treatise on Horse and Cattle-breeding, with some Remarks on Sheep and Dogs." The precepts of Virgil—if, indeed, they were ever generally practised—were, however, gradually forgotten, and it was not until the close of the 18th and the early part of the 19th century that anything like general methodical breeding took place. The first subjects systematically experimented on were sheep and cattle; and Darwin quoted Lord Somerville as saying with reference to what had been effected by breeders of sheep: "It would seem as if they had chalked out upon a wall a form perfect in itself, and then had given it existence." These breeders acted upon the principle which Darwin afterwards called *Methodical Selection*—or that which guides a man who systematically endeavours to modify an existing breed, according to some predetermined standard. [*See* articles CATTLE, DOG, and other domestic animals.] The laws governing the artificial formation of breeds may be formulated thus: (1) No two individual of any species, variety, or breed are exactly alike in all particulars. (2) Under certain circumstances constitutional variations may be transmitted to future generations. [ENVIRONMENT, HEREDITY.] There is strong probability that in every case there is a latent tendency to transmit such variations, though this tendency may be overruled by other tendencies. (3) By persistently breeding from parents possessing any given constitutional variation, we may produce a race in which the variation will be so impressed upon the organisation as to be permanent. But, since the result of too long-continued in-and-in breeding is to produce degeneration, this must be guarded against by judicious crossing to introduce new blood.

In conclusion, it must be borne in mind that scarcely any two authorities will define a breed in the same or in interchangeable terms. We speak of "breeds" of cattle, and here the extension of the term is wide, for it covers all the strains of blood in the Shorthorns or Devons, while by the poultry and the pigeon breeder the term is often so limited as to mean no more than a strain or at most a subbreed. [SPECIES.]

Brehm, ALFRED EDMUND, naturalist, was born in 1829 at Renthendorf, in Thuringia. He was a wide traveller, and in 1863 became keeper of the Hamburg Zoological Garden, founding the Berlin Aquarium in 1867. His chief work, *Illustrirtes Thierleben*, was published in 1876–79, and comprises 10 volumes. He died in 1884 at Renthendorf.

Brehon Law, the customary law of ancient Celtic Ireland, embodied in a number of text books, of which the book of *Aicill* and the *Senchus Mor* are the best known, and which have been translated and published with a commentary, by the Irish Government, at intervals since 1865. Sir Henry Maine describes it as consisting of a pre-Christian element with a large admixture from the Scriptures, and in part from canon law, the whole being embodied in and extended by the dicta of famous Brehons or lawyers. These formed a separate literary and learned class, and may possibly be the successors of the sacerdotal order noticed in Gaul by Cæsar, and popularly known as the Druids. With their pupils, who were treated as their adopted sons, they formed a sort of guild modelled on the family, which soon, of course, became connected by blood relationship. Both in origin and nature the law presents some analogy to Hindu law, and to the earliest codes of other Aryan peoples. Sanctions, except so far as it coincides with spiritual law, are conspicuously absent; but it was probably enforced, partly by custom and partly by the traditional respect entertained for the Brehons. While occasionally it exhibits advanced conceptions of equity, much of it is said to be fanciful and unreal. It was strongly condemned by Edmund Spenser in his *Present State of Ireland*, and by English observers generally from the 14th to the 19th centuries. The "historical method" in jurisprudence has caused a juster appreciation of it. *See* Sir Henry Maine's *Early History of Institutions*, c. 1, 2.

Breitenfeld, a village of Saxony, is four miles N. of Leipsic. It is noted as the scene of two battles in the Thirty Years' war—in 1631, when Gustavus Adolphus defeated Tilly, and in 1642, when the Swedes were again victorious under Torstenson over Archduke Leopold and Piccolomini.

Bremen, one of the free cities of Germany, is situated on both banks of the river Weser—the Old

town being on the right bank, the New on the left. The ramparts of the old town provide pleasant promenades, and it has public buildings of considerable interest, such as the cathedral built on the site of Charlemagne's wooden church, and with a leaden vault in which bodies may be kept for some time without decomposing, the Gothic town hall, in whose wine cellar is said to be hock of the vintage of 1624, and the observatory of Dr. Olbers (1724–1840), whence he discovered the planets Pallas and Vesta. The foreign trade of Bremen is extensive, and from its chief port at Bremerhaven it ships more emigrants to the United States than any other European port excepting Liverpool. It is the headquarters of the North German Lloyds steamship lines. Of its industries the chief is in tobacco, snuff, and cigars. It has also manufactures in cottons, linens, brewing, distilling, sugar-refining, and ship-building. In 788 Bremen was made a bishopric by Charlemagne, and in 858 an archbishopric. In 1283 its citizens joined the Hanseatic league, and after various political vicissitudes it was taken in 1806 by the French. In 1815, however, the Congress of Vienna restored it to independence. The territory, of which Bremen is the capital, covers an area of 97 square miles, and is for the most part a sandy tract.

Bremer, FREDERIKA, novelist, was born in 1801, near Abo, in Finland. Chiefly brought up in Sweden, whither her family removed on the cession of Finland to Russia, she in 1828 made her first public appearance as an authoress in *Sketches of Every-day Life*, which at once attracted notice, and won for her the gold medal of the Swedish Academy. Other works soon followed, and procured for her a European reputation. Through her friend Mary Howitt her novels became known to English readers. In 1849 she visited America, and in 1853 published simultaneously in America, England, and Sweden, her *Homes of the New World*. Latterly Miss Bremer gave up fiction, and devoted herself to philanthropic work, and chiefly to the emancipation of women. Quitting Stockholm in 1864, she retired to Arsta, where she had lived as a girl, and died in the following year. Her books have been translated into nearly every European language.

Bremerhaven, the seaport of the free city of Bremen, stands on the right bank of the Weser, at the mouth of the Geest, and was founded by Bremen in 1830 for the accommodation of large vessels. It has an excellent harbour, large wet and dry docks, and is remarkable for its great hospitium for emigrants, where 2,500 persons can be lodged.

Brendan, or BRENAUM, ST., of Clonfert, was born in 484 at Tralee, co. Kerry. After completing his studies he was ordained by Bishop Erc and then became possessed of a desire to go in search of "the mysterious land far from human ken." After years of unsuccessful wandering he returned home, only, however, to set out again. In 553 he founded a monastery at Clonfert and afterwards visited St. Columba at Hy. The *Navigation of St. Brendan* was a popular book in France, Spain and Holland in the 11th century. St. Brendan's death occurred in 577. His day in the calendar is May 16.

Brenner Pass, situated in the Central Tyrolese Alps, on the road between Innsbruck and Botzen, is crossed by a railway that has now a competitor in the St. Gothard railway. Its highest point is at less altitude than the highest points of any other of the passes crossing the Alps.

Brennus, the title of several Gallic chiefs, of whom the most famous led the Gauls across the Apennines into Italy and overthrew the Roman army on the banks of the Allia in 391 B.C. Had Brennus pressed on immediately, he would have had Rome entirely in his hands. As it was, the Romans gained time to put the Capitol in a state of defence. On the third day the Gauls entered the city and found it occupied only by aged patricians sitting in their official robes in the porches of their houses. These were slaughtered and the Capitol was beseiged for six months, being saved from a surprise attack by the cackling of the sacred geese in Juno's temple. At last the Romans entered into negotiations with the Gauls, who agreed to accept a thousand pounds weight of gold to leave the city. While the gold was being weighed out, Brennus threw his sword into the opposite scale and exclaimed, *Vae Victis!*—Woe to the conquered. Enraged at this insolence, Camillus, according to a legendary account, broke off the negotiations, and, offering battle to the Gauls, totally defeated them. Another Brennus invaded Greece in 280 B.C. and attempted to plunder the temple of Delphi. The Delphians, however, aided by an earthquake and a thunderstorm, routed the Gauls, making Brennus himself a prisoner, who, unable to endure the pain of his wounds, took his own life.

Brent Goose (*Berniela brenta*), an Arctic goose visiting the maritime counties of Britain, especially on the east and south coasts, in the winter. The adult male bird is about 21 inches long, the female a little smaller. Plumage of head and neck black, with a small patch of white on each side of neck; back brownish black, upper and under tail-coverts white; upper part of breast black, rest of under surface slate-grey, legs and feet black. It is much esteemed for the table. [BARNACLE GOOSE.]

Brenta, a river of Italy, rises in the Tyrol and traverses Lombardy, passing the town of Bassano. After uniting with an arm of the Bacchiglione below Padua, it enters the Adriatic Sea at Brondolo.

Brentano, CLEMENS, author, was born in 1778 at Frankfort-on-the-Main. After studying at Jena and spending some time successively at Heidelberg, Vienna, and Berlin, he withdrew in disgust at sublunary affairs to Dülmen in 1818. Meanwhile he had published various of his poems, the first in 1800, a collection of satires and poetical dramas. In 1804 appeared *Ponce de Léon*, in 1816 *Die Gründung Prags*, and in 1817 *Victoria*—his best pieces, and marked by strong dramatic power and rich humour. He also wrote novels, of which the most successful, *History of Caspar the Brave and the Fair Annerl*, has been translated into English. He died in 1842 at Aschaffenburg.

Brentford, in Middlesex, is situated on the Thames about seven miles west of London, and is intersected by the Brent, which here flows into the Thames. A bridge across the Thames unites it with Kew. It is surrounded with market gardens, is the seat of the Grand Junction Waterworks, and has industries in distilling, brewing, soap-making, foundries, etc. It was at Brentford that Edmund Ironside defeated the Danes in 1016, and Prince Rupert the Parliamentarians in 1642. Pop. (1901), 15,171.

Brenton, (1) SIR JAHLEEL, British naval officer, was born in 1770, and became a lieutenant in 1790. He served in the *Barfleur*, 98, at the battle off Cape St. Vincent in 1797. He was promoted to the rank of commander in 1799 and to that of captain in 1800, and in 1801 was Sir James Saumarez's flag-captain in the *Cæsar*, 80, in the actions of the 6th and 12th of July. Two years later he had the misfortune to be wrecked in the *Minerve*, and taken prisoner, but, having been exchanged and appointed to the *Spartan*, he won in her a notable action with the *Cérès* and consorts in the Bay of Naples in 1810. In this gallant affair he was wounded. He was made a baronet in 1812, a rear-admiral in 1830, and a vice-admiral in 1840, and died in 1842. (2) His brother, Edward Pelham, naval officer and historian, was born in 1774, became a captain in 1808, and died in 1839. His *Naval History of Great Britain* from 1783 to 1822 was published in 1823, and his *Life of St. Vincent* in 1838. These officers were the sons of Rear-Admiral Jahleel Brenton.

Brenz, JOHANN, reformer, was born in 1499 at Weil, Swabia. He early became an adherent of Luther, and in 1536 was invited to head the Reformation in Würtemberg. He was one of the authors of the Würtemberg Confession of Faith, and his catechism ranked next after Luther's amongst German Protestants. He was obliged to flee to Stuttgart on account of his opposition to the Interim of Charles V., and becoming superintendent there in 1553 died in 1570.

Brescia, a town of Lombardy, capital of the province of Brescia, about 50 miles from Milan, is one of the finest towns of Lombardy. It is situated at the foot of a spur of the Rhætic Alps, between the river Mella and the canal which falls into the Oglio. The town is in the shape of a parallelogram, about four miles in circuit, and is walled and defended to the N. by a fortress. It is the seat of a bishopric, and in its cathedral and fine churches are some good examples of the Venetian school of painting. It has a good library of about 30,000 volumes, with some rare manuscripts and antiquities. The trade has decayed. Its cutlery and its manufacture of arms once gained for it the epithet of "*Armata*." Its linen and cotton weaving industry is important, and silkworms are extensively bred in the neighbourhood. There is a considerable trade in arms, cattle, flax, linen, oil, wines, silk, and hardware.

Brescia, in Latin *Brixia*, is thought to have been an Etruscan colony. It was long allied with the Romans, till Julius Cæsar incorporated it in the Fabian tribe. Passing during the later troubles of the district from Ostrogoths to Lombards, and from these to Charlemagne, it became an independent republic in the 11th century, and joined Milan in its struggle against Frederick Barbarossa, Frederick II., and Henry VII. It afterwards fell into the power of the Visconti. In the 16th century it was twice taken by the French, and Bayard was wounded at the second siege. From 1796 it has shared the general fortunes of Lombardy. Among its monuments is the temple of Vespasian, which now contains a museum, where is to be seen, among many other valuable remains, the celebrated Greek bronze statue called the *Winged Victory of Brescia*. The 15th and 16th century town hall is a building of much interest. A fire which nearly destroyed it in 1573 consumed three large pictures painted by Titian in his old age. In the Campo Santo outside the city the tombs are arranged against the wall like the ancient *columbaria*.

Breslau, Prussian town about 200 miles S.E. of Berlin, capital of the province of Silesia, on the left bank of the Oder, is divided into the Old and the New town, and has seven suburbs. It is the seat of a prince-bishopric, and has some fine churches, besides the cathedral, a celebrated university, and many educational establishments. There are important manufactures, including cannon-founding, arsenals, goldsmiths' work, engines, tobacco, spirits, liqueurs, and chemicals; and the trade of the city is remarkably active owing to its situation in the centre of the most productive manufacturing province of Prussia, and to the facility of communication. The chief objects of commerce are metal ores from the Silesian mines, wood, cloth, wool, and linen. The June and October wool fairs of Breslau are the most important on the Continent. The 12th century cathedral of St. John is noted for the delicacy and graceful proportions of its architecture. On the principal door of finely-carved oak is a representation of Joseph sold by his brethren; and inside are some fine statues, including one of St. Elizabeth by Ercole Fioretti. The town hall is a curious example of 14th century architecture. Founded in the 10th century, Breslau was by turns Polish, Bohemian, and Austrian, till, in the 18th century, it was twice taken by Frederick II. In 1807 the French took it, and blew up the fortifications, whose site is now occupied by boulevards. From Breslau in 1813 Frederick William III. of Prussia issued his celebrated appeal to the Prussian people, which aroused them against the French domination.

Bressay, an island of the Shetland group, of about 10¾ miles in area, about four miles in length, and from two to three miles broad. It has good peat beds, some fine slate quarries, and is a fishing station. Bressay Sound, between Bressay and the mainland, is a good anchorage, and whaling vessels, as well as those engaged in the herring-fishery, are to be found here. The harbour of Lerwick with its lighthouse is in this Sound. To the east of Bressay is the rocky isle of Noss, six miles round, and to a detached rock in its neighbourhood communication is made by means of a cradle running upon ropes.

Brest, a seaport of Finistère, in France, about 350 miles N.W. of Paris, capital of arrondissement and of three cantons. It is a garrison town and a naval station, and possesses both arsenal and dockyards, and is a town of increasing importance as a military and naval port. Its trade is not very extensive. The chief export is corn, and the chief imports are colonial produce and naval stores. The roadstead of Brest is one of the finest and safest in Europe, and will hold more than 500 ships of war. The harbour, formed by the Penfeld, includes the military harbour, and the old mercantile harbour; while the new commercial harbour is in that part of the roadstead which lies to the S. of the town. The roadstead communicates with the sea by a passage about three miles long, and varying from 2,000 to 4,000 yards in width, well defended by batteries, and well lighted by five lighthouses. The military harbour with its belongings is of vast extent and great importance, and is fitted with every appliance necessary for fitting out vessels of war. This harbour is defended by powerful batteries, and by a citadel called the "Château," which occupies the site of an old Romano-Gallic fort. The arm of the sea into which the Penfeld falls is crossed by a fine iron turning-bridge. The mouth of the Penfeld divides the town into Brest proper, and Recouvrance, which was formerly only a suburb, difficult of access. A bridge now joins the two parts. Brest proper is built on the slope of a hill, and forms naturally a high and low town. Of these the latter, in the neighbourhood of the port, consists of narrow winding streets; while in the former the streets, some of them, climb like veritable ladders, and the fifth storey of one house is on a level with the garden of another. Brest has no very remarkable monuments. The high altar of the church of St. Louis has a baldachin supported by four antique marble columns, which came from an ancient temple of Serapis at Lebedah. In the Middle Ages the possession of Brest was considered so important that there was a saying, "He who is not lord of Brest is not duke of Brittany." The English possessed it for a time, and vainly tried to take it, with Holland, in 1694, and alone in 1757. It was Richelieu who first determined to make it a marine arsenal.

Brest Litovsk, a town of European Russia, in the government of, and about 120 miles S. of, Grodno, 132 miles from Warsaw, and 682 from Moscow, at the junction of the Moukhavetz and the Boug. It has, or had, a considerable proportion of Jews in its population. It is the seat of an Armenian Catholic bishopric, and has a fortress and military school. The town possesses cloth factories and tanneries. Souwaroff gained a victory here in 1791 over the Poles.

Bretigny, a French hamlet, in the arrondissement of Eure and Loire, from five to six miles S.E. of Chartres, and 20 miles S. of Paris. Here in 1360 was signed the treaty by which King John II. of France recovered his liberty, after four years' imprisonment in England, Edward III. abandoning his claim to the throne of France upon condition of receiving a heavy ransom, and of having his rights to the English possessions in France recognised.

Breton de los Herreros, DON MANUEL, born 1796, Spanish poet and dramatic author. He is said to have composed poetry at the age of seven. Poverty brought him and his brother to Madrid to seek employment. Here the brother died, and Manuel was educated by the Christian Brothers. At 18 he entered the army as a volunteer, and served till 1822, when he retired, and got some government employment. On the restoration of Ferdinand he lost his place, and took to literature as a means of support. His first dramatic work was produced with success in 1824, and ten years after, at the height of his literary career, he was appointed guardian of the national library. He lost this in 1844 for a poem he wrote in honour of Espartero. He was elected member of the Spanish royal academy in 1837, and he was made commander of the Order of Charles II. He was a prolific writer, though much of his work was re-adapting already existing French or Spanish pieces. He excelled in the delineation of female nature, especially in its caprice and inconstancy; and it is in comedy and satire that he principally shows his qualities of style. There is a complete edition of his works.

Bretschneider, HENRY GODFREY VON (1739–1810), German man of letters. He was son of the burgomaster of Gera, and entered the Count de Bruhl's regiment as cornet, took part in the battle of Kolin, became a captain, and was taken prisoner by the French. He utilised his imprisonment in learning the language and studying the character of his captors. After his return to Germany he was appointed Governor of Usingen, in Nassau, but this post being suppressed he went to London and then to Paris, where he found some diplomatic employment. In 1772 he went again to Germany, and after working at Coblenz for a time, he passed into the service of Austria, and finally settled down at Breda. Here his religious views and his satirical writings embroiled him with the ecclesiastical authorities. He left Breda, and became librarian at Lemberg. In 1809 he retired with the title of Aulic Councillor, and went to Vienna, where he soon after died. Of a biting and satirical wit, his great object was to expose anything false, whether in art or in morals. Among his many writings may be cited the terrible story of the sad death of Werther, a satire upon the sentimental dreams, and the ideas of suicide, popularised in Germany by Goethe's novel.

Bretschneider, KARL GOTTLIEB (1776–1848), a German theologian, born at Gresdorf. He was pastor successively at Schneeberg and Anneberg, and was invited in 1812 to take a chair of theology at Berlin. With the modesty that sometimes goes with learning he declined this honour, and was appointed superior councillor of Consistory. He composed a great number of works.

Bretwalda (possibly *ruler of Britain*, or *widely ruling*, from Anglo-Saxon *brytan*, to distribute), a title, given to seven Anglo-Saxon kings by Bede, and to another besides by the Anglo-Saxon Chronicle, apparently as holding a sort

of primacy in, or headship of the confederacy of, Anglo-Saxon kingdoms. Their claims to it seem to have been but slight in some cases. In most cases (according to Stubbs) the headship of the Bretwalda was one of power and influence only, occasionally it was acknowledged by acts resembling formal commendation (q.v.), which thus paved the way for regular feudalism. Such acts implied that the weaker sovereign resigned the control of the foreign policy of his kingdom to the Bretwalda. Very possibly the relation was an imitation of that between the Roman emperor and some of the so-called "allied kingdoms" or "subject allies." (*See* Stubbs, *Constitutional History*, i. 162, and Freeman, *Norman Conquest*, i. 542 *seq.*)

Breughel, the name of a Flemish family of painters, derived from the village of Breughel, near Breda, from which they came. The most noted of them are :—

1. PETER BREUGHEL, the Elder (1510–1567, or according to some 1530–1600). He studied at Antwerp and in Italy, and finally settled in Brussels. He was of the Flemish school, and chose for his subject those homely and humorous scenes of Flemish life which Teniers and Van Ostade have made us familiar with. He was fond, too, of Scriptural subjects, which, however, he made Flemish in costume and surroundings.

2. PETER BREUGHEL, the Younger (1559–1637). He lived chiefly at Antwerp, and was commonly called "Hell" Breughel, from his fondness for painting fires and other sombre or fiery subjects. His *Fall of the Rebel Angels* is in the Brussels Museum.

3. JOHN BREUGHEL, brother of the last-mentioned, and son of Peter the Elder (1569–1625, or 1575–1642). He painted at Rome for Cardinal Borromeo, and among his subjects were *Daniel in the Lions' Den*, *St. Jerome in the Desert*, *Antwerp Cathedral*. He was a good landscape painter, in spite of his excessive use of certain pronounced colours, and is said to have painted still life in the compositions of Rubens and others. To distinguish him from Peter, he was called "Velvet" Breughel; but whether with reference to his dress or to his manner of painting is not clearly known.

Breve, a name sometimes used for any of the Old World Ant-thrushes. [ANT-THRUSH, BUSH-SHRIKE.]

Breve, in *Music*, a note equal to two semibreves or four minims (q.v.). Formerly it was square ( ), but it is now oval in shape ( ). It is seldom employed in modern music.

Brevet, in military language, is an honorary rank in the British and United States army, conferred in the former by royal warrant. The brevet rank gives no right of command in the corps to which the officer belongs, nor does it now carry with it the right to advanced pay.

Breviary, the ecclesiastical name given to the volume which contains the daily offices in the Roman Catholic Church, as distinct from those contained in the *Missal*, the *Manual*, and the *Pontifical* (q.v.). The recitation of the Breviary is at present imposed on all beneficed clergy, all persons in holy orders, and all "religious men and women, professed for the duties of the choir." Pope Gregory VII., in the eleventh century, is said to have been the first to settle the compilation of the Breviary, but since then it has undergone various changes. In 1536 a reformed breviary by Cardinal Quignonez superseded the older one, and it is on this work that the English Prayer Book of the present day is, to a large extent, founded. In 1568, however, Pius V. imposed a reformed edition of the old Breviary, and this is still generally in use in the Roman Church. The Breviary services are all in Latin, but an English translation has been made by the Marquis of Bute. The services consist of readings from the Psalms, the Old and New Testament, the Fathers, hymns, prayers, confessions, creeds, etc.

Brevipennes, Cuvier's name for what are now called the Cursorial birds (q.v.).

Brewer, JOHN SHERREN (1810–1879), an English man of letters. He was a member of Queen's College, Oxford. He took orders, and was appointed professor of King's College, London. For twenty years he was employed in the Record Office, where he did much valuable work. His essays and reviews in *English Studies* show great knowledge and research, and are pleasant in style. He was elected Honorary Fellow of Queen's College in 1870, and in 1877 was nominated to the living of Topplefield, Essex.

Brewing, or the manufacture of alcoholic beverages from grain, is almost universally practised among the different races of mankind, and has been known since very ancient times. The necessary materials for the brewing of beer are water, hops, and malt. The water employed should be bright and clear, and should contain very little organic matter. The presence of different mineral salts, however, is necessary for the production of good ales. The hops for brewing are grown largely in Worcester, Sussex, Surrey, and Kent. They are picked about the beginning of September, taken direct to kilns and dried. They impart to the beer a pleasant taste and odour, and act also as a preservative. In this country barley is the grain always employed for conversion into malt. During this conversion a substance, "diastase," is formed, which has the power of converting the insoluble starch of the grain into a soluble and fermentable sugar. The process of malting consists of the following operations :—The grain is first steeped in water for 40 or 70 hours—*steeping*. The water is changed at intervals of about 12 hours, and is finally run off, and the grain spread in thin layers over the floor—*flooring*—to germinate, being from time to time turned over with wooden spades, and the temperature regulated by altering the thickness of the layers. When germination has proceeded far enough the seed is removed to kilns and dried—*kiln-drying*. The malt is then stored in bins until required. The next process it undergoes is known as *mashing*, in which all the soluble constituents are extracted by water. It is first crushed by smooth rollers, and the ground malt and hot water are run into the *mash-tuns*—wooden or cast-iron circular

tubs, provided with false perforated bottoms. The malt and liquid are well stirred by mechanical contrivances, the temperature being kept about 60° Fahr., and after a couple of hours the liquor—*wort*—is run off, and should be clear. The operation is repeated with a smaller quantity of water. The wort is then pumped into copper boilers, and boiled with the requisite amount of hops—*boiling*. From these it is run out into shallow tanks, the "coolers," and frequently into refrigerators—*cooling*. It is next run into the "fermenting tuns" to undergo the last process—*fermentation*, which requires great care and attention. It is brought about by adding yeast to the wort, and allowing the liquor to stand, the temperature being kept at about 58° to 60° Fahr. until fermentation (q.v.) has proceeded sufficiently far. It is then "cleansed" to remove the yeast and scum, and run into casks.

Brewster, Sir David (1781–1868), English physicist. Born at Jedburgh, he went at 12 years old to the University of Edinburgh. He was educated for the Church, but timidity is said to have kept him from entering it. In 1802 he became editor of the *Edinburgh Magazine*, and in 1808 he was chosen to edit the *Edinburgh Cyclopædia*. In 1831 he had a hand in starting the British Association, and from 1859 to 1867 he was the principal of the Edinburgh University. But his name is chiefly known by his services to science, and especially for his efforts towards the elucidation of the principles that govern the laws of optics. The kaleidoscope was his invention, and he made such improvements in the stereoscope as almost amounted to a new invention, while he shares with Fresnel the honour of applying the dioptric principle to the illumination of lighthouses. His writings were numerous. Among them may be mentioned his *Life of Newton* and his *Letters on Natural Magic* addressed to Sir Walter Scott. There is a life of him edited by his daughter.

Brian, surnamed Boru or Boroihme, *i.e.* the conqueror who makes them pay tribute, an Irish king, who may be called the King Alfred of Ireland, both as to his conquests and his efforts for the improvement of his people. He succeeded in 976 his brother, who was a petty kinglet. He made himself king of Cashel by his sword, and also made his rule felt in Munster, and in 984 was acknowledged king of Leinster. He established his chief seat of government at Killaloe, and had establishments at Tara and at Cashel. He allied himself with the Danes, and by their aid became King of Ireland. In this latter capacity he founded universities and made efforts in all directions for the well-being of his people. In his old age he gave the Danes a crushing defeat at the battle of Clontarf, but paid for the victory with his life. King Brian is said to have introduced the patronymic prefixes "Mac" and "O," the former to denote "the son of" and the latter to denote "the grandson or further descendant of."

Brianchon, Charles Julien (1785–1865), French mathematician. He was born at Sèvres and entered the École Polytechnique in 1808. He took part in the Peninsular campaign, and in 1815 was appointed assistant-director in the government arms factory; and in 1818 was appointed professor of applied sciences at the school of artillery of the royal guard. He wrote many treatises, and gave a good deal of attention to the question of gunpowder, and the nature and conditions of explosions.

Brianchon's Theorem, in *Geometry*, is that the three diagonals of any hexagon circumscribed about any conic, pass through a point. The theorem is reciprocal to that of Pascal (q.v.), and may, therefore, be deduced therefrom by the principle of duality.

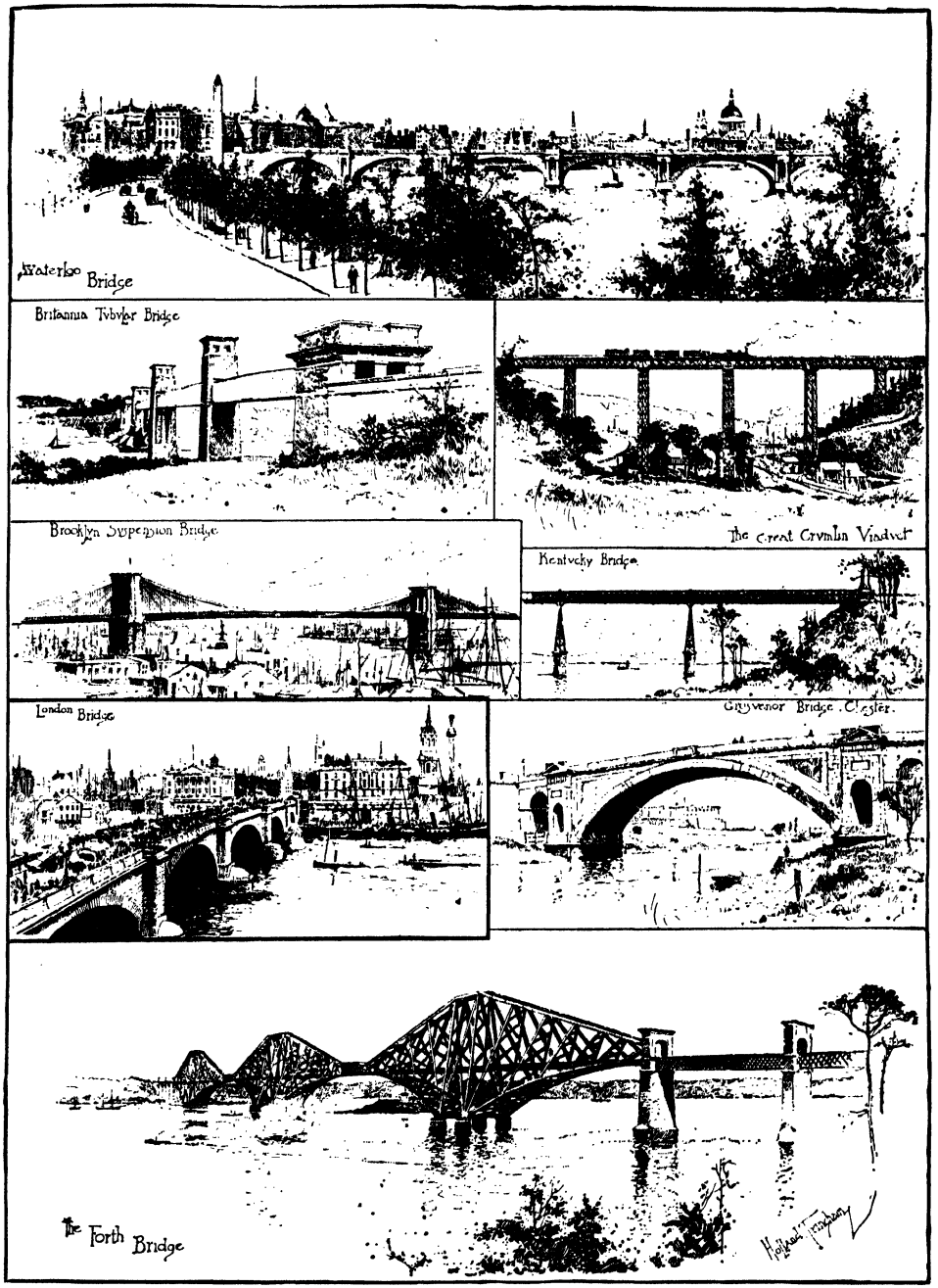
Briançon, a French town of the Hautes Alpes head of arrondissement and canton, 162 miles N.E. of Marseille, on the right bank of the Durance. It has an arsenal, and is the military depôt for the French Alps. Its chief industries are weaving, tanning, hat-making, knitting, and the working of a talc which goes by the name of Craie de Briançon (Briançon chalk). The neighbourhood also produces medicinal and dyeing plants. The Guisanne and the Clairée unite to make the Durance, and there is a single-arch bridge of a considerable height above sea level. The town is situated on a very steep slope, and it has fine fountains and a pretty church.

Briansk, a town in Russia, on the Desna, 77 miles west of Orel. Its chief industries are a cannon foundry and iron-works and glass-works. It also has some trade in grain, hemp, honey and wax.

Briareus, in Greek mythology, a son of Ouranos and Gaia who had 100 hands and 50 heads. He was thrown into the sea by Poseidon, and then imprisoned beneath Ætna. Zeus took him from this situation for the sake of his aid against the Titans, and protected him from that time forward. The people of Chalcis honoured him under the name of Ægæon.

Briar-root, a name corrupted from the French *bruyère*, for the wood of the tree-heath, *Erica arborea*, which has of late years been largely employed in the manufacture of tobacco-pipes. The violet-scented wood of *Acacia homalophylla* and other Australian species known as "Myall" (wild) wood is similarly employed.

Bribery, in English law, has a threefold meaning, as follows:—(1) The offence of a judge, magistrate, or other person entrusted with the administration of justice, accepting a fee or reward of any kind from the litigant parties to induce a favourable decision; (2) the receipt or payment of money to a public or ministerial officer with a view of inducing him to act contrary to his duty; (3) the giving or receiving money to procure votes at Parliamentary or other elections to public offices of trust. (1) By a statute passed in the second year of the reign of Henry IV. "all judges, officers, and ministers of the King convicted of bribery shall forfeit treble the bribe, be punished at the King's will, and be discharged from the King's service." The



BRIDGES.

1 Waterloo Bridge (*From a photograph by Messrs. G. W. Wilson & Co., Aberdeen*). 2 Britannia Tubular Bridge. 3 The Great Crumlin Viaduct (*From a photograph by Messrs. Catherall & Pritchard, Chester*). 4 Brooklyn Suspension Bridge. 5 Kentucky Bridge. 6 London Bridge (*From a photograph by Messrs. G. W. Wilson & Co., Aberdeen*). 7 Grosvenor Bridge, Chester (*From a photograph by Messrs. Catherall & Pritchard, Chester*). 8 The Forth Bridge (*From a photograph by Messrs. Valentine & Sons, Dundee*).

person who offers the bribe is guilty of a misdemeanour. The corruption of our English judges in earlier times was notorious and indisputable. It is noticed by Edward VI. in a discourse of his published by Burnet, as a complaint then commonly made against the lawyers of his time (Burnet's *History of the Reformation*, vol. ii., App. p. 721), and it prevailed to a much later period of our history, notably in the case of Lord Bacon, who confessed to the charge of bribery made against him, and by way of palliation referred to *judicial* corruption as being "the vice of the times." Since the Revolution in 1688 judicial bribery has been unknown in England, and no case is to be found in the Law Reports since that date in which this offence has been imputed to a judge in courts of superior or inferior jurisdiction. (2) Bribery in a public ministerial officer is a misdemeanour at common law in the person who takes and also in him who offers the bribe. Bribery with reference to particular classes of public officers has become punishable by several acts of Parliament. (3) Bribery at elections vitiates the same. As to parliamentary elections, the subject is now regulated by the Parliamentary Elections Act, 1868. Since the introduction of the ballot system the offence has, of course, become much less frequent if not entirely obsolete, as no one can now, with any safety, ensure a vote by bribery. As to bribery at municipal elections, *see* the Municipal Corporation Act (5 and 6 William IV., c. 76).

Brice, ST., a Bishop of Tours and confessor of the 5th century. He was the disciple and successor of St. Martin, who converted him after a dissolute youth. His name is known in England chiefly from the fact that it was on his day, in 1002, that Ethelred II. ordered, or permitted, a general massacre of Danes; and the vengeance of Sweyn for the slaughter of his countrymen, among whom was his own sister, changed the dynasty of England.

Brick was made from clay in very ancient times, and is found in Babylonian and Egyptian ruins. All clays consist essentially of a hydrated silicate of aluminium with, usually, some free silica, iron, lime, magnesia and potash. The clay is mixed into a pasty condition with water in the "pug mill," and then moulded to shape, either in a wet plastic, or in a semi-dry condition. In the latter case they are taken direct to the kiln to be baked, in the former they require drying first. The time of baking or "firing" varies with different kinds of clay from 40 to 150 hours. The fire bricks for building furnaces, etc., require to be of very refractory clay and should contain but little iron or alkaline oxides.

Bridewell, originally a well of St. Bride or St. Bridget, between Fleet Street and the Thames. There was originally a castle here, and a royal palace. This was rebuilt in 1552 for the reception of the Emperor Charles V. and his suite, and Henry himself occupied, or thought of occupying it. Bridewell gave its name to a parish, and Edward VI. gave the palace to the City of London as a House of Correction, under which character it was, till comparatively lately, well known.

Bridge (A.S. *brycg*, Ger. *brücke*), a structure traversing a roadway, river, or other impediment, mainly for the purpose of providing a convenient passage across from one side to the other. An account of the more important bridges, taken in the order of their construction, will show the history of their development from the simplest types to the more highly differentiated forms of the present day, though it should be noted that this development has been much more rapid of recent years, since the introduction of railways, than ever before. Leaving the simple expedient of laying a beam of some sort across the gap that has to be traversed, we find that the cantilever principle, recently adopted on a gigantic scale at the Forth bridge, was known and adopted many centuries ago. Beams of timber were fixed in each bank of a stream, and made to project bracket-wise towards each other. A centre beam resting on their two ends effected the span. Built on this principle there exists an ancient bridge across the Sutlej of 200 ft. span.

The arch was probably first introduced by the Romans, whose bridges generally consisted of semicircular arches supporting horizontal roadways, existing examples of which are afforded by the Ponte de Rotto, built 2,000 years ago, and the Pont du Gard at Nimes. This latter is very remarkable both for its design and clever workmanship. It is a combined aqueduct and viaduct. It consists first of a six-arch bridge, 465 ft. long, over the river Gardon. Then this supports a second series of eleven arches continued to the sides of the valley, and this, again, carries a third series of thirty-five arches, supporting a canal 850 ft. in length and 190 ft. above the river. It is built of large stones correctly cut to the required form, and fixed together by iron cramps.

The dynamics of the masonry arch are much more intricate than that of the cantilever, consisting as the former does of a large number of small elements that have to be built up together so as to be mutually supporting. Each stone in the arch is acted on by its neighbours and by the weight it sustains. These forces must balance each other for every stone, and must remain in equilibrium when the load on the arch is varied. The compression due to the lateral forces on the stone must not exceed a certain limit, or the stone will crush. Also the resultant compressive force on any side face must act on the middle third of that face, or there will be a tendency to heave at parts in tension. Speaking generally, if the *crown* or topmost portion of the arch be too light the deadweight at the *haunches* or those parts springing from the piers will lift the crown, and the whole arch be reduced to ruin. And if the crown be too heavy the haunches will open up, the crown will sink, and the arch collapse. The lateral forces involved are larger when the arch is flatter, *i.e.* when it is semi-elliptical or a small segment of a large circle, than when it is semi-circular, with the same span.

The *centering* (q.v.) or arrangement of scaffolding upon which the arch is built requires careful designing. It must be sufficiently strong to support the unfinished work, it should be easily removable, and

its total removal should cause no change of shape of the arch.

The largest stone arch span in the world is in the Washington aqueduct. It was built by Meigs, and is of 220 ft. The second largest is that of the Grosvenor bridge, built by Hartley in 1832 over the Dee at Chester. It consists of a single segmental arch of 200 ft. span, with a rise of 42 ft., and is built of granite and sandstone. Another good example of single-arch bridge is that over the Taff at Pontypridd in South Wales. It was built by William Edwards in 1750, with a span of 140 ft. and a rise of 35 ft. The deadweight at the haunches, which in a bridge built previously by Edwards had been so great as to lift the crown up and ruin the bridge, is diminished by filling the internal spaces with charcoal and by having each side perforated by three cylindrical openings.

Elliptical arches were introduced by Rennie, whose engineering skill has its permanent record in his magnificent bridges over the Thames. Waterloo Bridge, a finely-built structure of granite, has nine equal semi-elliptical arches of 120 ft. span, with a rise of 32 ft. The width of the bridge is 42 ft. and its length 1,380 ft., with 1,100 ft. of approaches. Cofferdams (q.v.) were employed in the building of the piers, with steam engines to pump out the water. London Bridge consists of five semi-elliptical arches, the centre one of 152½ ft. span, the two next of 140 ft., and the end two of 130 ft., thus giving a clear waterway of 692½ ft. The width of the roadway is 52 ft., the rise of the centre arch 37½ ft., and the full length of the bridge 1,005 ft. The river has a soft alluvial bottom about 30 ft. deep at low water. The piers and abutments are supported on cofferdams, the floors of which rest on piles about 20 ft. long. The restricted waterway due to the older bridge still remaining, 180 ft. lower down, while the new one was being built, tidal action and other causes supplied many practical difficulties, which, however, were all satisfactorily overcome, and the bridge was opened in 1831, having taken seven and a-half years to build.

Arched bridges of cast-iron and of wood have been built. Southwark Bridge, over the Thames, like the previous two, designed and built by Rennie, is a fine instance of the cast-iron arch bridge. This was opened in 1824. There are three arches, each consisting of eight cast-iron ribs, the central arch of 240 ft. span, with a rise of 24 ft., the two side arches of 210 ft. span, and rising 19 ft. Each rib is 2⅛ in. thick, and is built up in lengths of 13 ft., which are bolted together. The ribs are connected by transverse plates. The weight of metal in the central arch is 1,600 tons, in each of the side arches 1,460 tons.

The Newcastle-upon-Tyne high level railway bridge is composite in character, having arched ribs of cast-iron strengthened with ties of wrought-iron. It is, in fact, a form intermediate between the arch and the girder, to which latter type the chief railway bridges since that time have tended. Girders are more fully discussed separately, but it should be stated here that they are simply beams of wood, cast-iron, wrought-iron or steel, of such a section as to be best able to resist fracture due to bending or to shearing. The former of the two causes chiefly influences the shape and size the top and bottom flanges or booms of the girder the top boom being usually required to resist compression, the bottom boom to resist tensi The latter cause determines the nature of the w or bracing joining the two booms. If these joined by cross-bars forming a lattice, the girder called a *lattice-girder*. The girder may have t webs connecting the booms, one each side, and this case it becomes a long box of rectangu section, the top and bottom parts of which more substantially built than the sides. This fo is known as the *box-girder*, a type of great inter historically. For the first wrought-iron gir bridge of large span the Britannia tubular brid over the Menai Straits employed box-girders special design successfully. This bridge w designed and built by Robert Stephenson, a opened for traffic in March, 1850. The girders this case were made large enough for a line railway to be laid inside each, thus rendering t bridge simply two long rectangular wrought-ir tubes laid side by side, and supported by maso towers and abutments. Each tube is 14 ft. 8 wide, its height increasing from 22 ft. 9 in. at t abutments to 30 ft. at the centre, outside measu ments being given in each case. The roof and fl of each tube is cellular, to increase its strength a stiffness. The bridge has four spans, two of 460 over the straits and two of 230 ft. over land to t abutments. The tubes are supported by th masonry towers, and these end abutments at height of 100 ft. above high-water level, cast-ir frames taking up their weight at the supports. T central tower rises to the height of 230 ft., and built on the Britannia rock in the middle of t channel. The whole length of each tube is 1,510 Each of the longer spans weighs 1,587 tons, t shorter 630 tons, thus making up 4,680 tons as t total weight of each tube. They are fixed to t central tower, but have roller supports on the s towers and abutments so as to admit of free exp sion and contraction due to changes of temperatu Similar tubular bridges have been built on t Conway river, where the span is 400 ft., and on t St. Lawrence at Montreal, where the greatest sp is 330 ft. The latter is a railway bridge nearly t miles long, and has its piers specially adapted resist and break the ice that comes down the ri in spring. Coming next to the lattice-gir bridges which are nowadays in such extensive u we may instance the Charing Cross (South-East Railway) bridge, recently doubled in width to s the increase in traffic. This is 1,365 ft. long, and built with nine spans, six of 154 ft. and three 100 ft. Two lattice girders 50 ft. apart are suppor parallel to each other on piers of cast-iron or bri work. The booms of these main girders are 14 apart, and are built of plate-iron; they are h together by vertical bars and by diagonal braci Transverse girders are fixed across below the lo booms, and carry four lines of rails between t main girders. They also project outwards beyo each main girder, the projecting parts carryin footpath. A type of bridge very early employe

the *suspension* bridge. Piers are built each side of the obstacle to be crossed, and chains firmly fixed at each end pass over these piers and carry a roadway by means of hanging rods. The chain takes up a definite curvature, parabolic if the roadway is of uniform weight all along, but altering when any extra weight comes on. The stress in the chain is greatest at its lowest part, and is much increased if the chain be pulled out flatter across the same span. Oscillations produced in the structure by a comparatively light rolling load may by gradually increasing in magnitude become very dangerous. Hence the use of stiffened suspension bridges, in which the roadway is rendered more rigid by bracing, the result being to distribute the effect of the rolling load over a greater length of chain.

The Menai suspension bridge, close to the Britannia tubular bridge, designed and built by Telford, and opened in 1825, is a fine example of this type. Here the points of suspension are 580 ft. apart; two carriage-ways and a central footway are supported by four cables, each consisting of four chains, the composite links of which are built of flat iron bars 10 ft. long. The dip of the chain is 57 ft., the total length of the bridge is 1,710 ft., and the roadway is 100 ft. above high-water level. The largest simple suspension bridge in the world crosses the Sarine valley at Freiburg, in Switzerland. Its span is 870 ft., and the roadway is 167 ft. above the river. Clifton bridge, over the Avon, built by Brunel, has a span of 702 ft., and is at a height of 250 ft. above the Avon. This bridge is stiffened by longitudinal girders and by braced handrailing. Many stiffened suspension bridges now exist, by far the largest being the Brooklyn bridge, uniting New York with Brooklyn. The central span is of 1,600 ft., and there are two side spans over land, each of 930 ft. The towers are 276 ft. high, founded by caissons 80 ft. below the high-water mark. There are four suspending cables, 15¾ in. in diameter, each built up of 5,000 steel wires. The roadway is 80 ft. wide, and is in five parts, two for ordinary vehicles, two for cars, and a central one for foot passengers; the weight of the structure hanging between the towers is 7,000 tons.

The cantilever principle has recently been introduced in the building of girder-bridges of large span, by the successful erection of the Forth Bridge on the North British Railway at Queensferry. The engineers were Sir John Fowler and Mr. Benjamin Baker. At this place the estuary of the Forth is 1½ miles wide, and in parts as much as 200 ft. deep, much too deep to allow piers to be built there. This led to the adoption of two large spans of 1,700 ft. each, effected by three cantilevers. The shore ends of each of these give spans of 675 ft., and the remainder of the bridge consists of fifteen small spans of 168 ft. each. The centre of each big span is 152 ft. above high-water level, and the highest part of the cantilevers 361 ft. The piers upon which the big cantilevers are built consist each of four cylindrical masonry columns 36 ft. high, tapering from 55 ft. diameter at the bottom to 49 ft. at the top. They were founded by means of coffer-dams for the shallow parts and large caissons 70 ft. diameter for the deeper parts, sunk about 40 ft. below the river bed, and resting on rock or boulder-clay. The general view of the arrangement of each cantilever is shown in the plate; it may be said to consist of two enormous steel composite brackets placed back to back so as to balance each other, and forming a gigantic lattice girder one-third of a mile long, tapering each way from the middle outwards. The structure somewhat resembles the open beam of a chemical balance, each arm of which is over 600 ft. in length. The cantilevers also taper in plan so as to resist wind pressure more effectively, the width diminishing from 120 ft. at the piers to 32 ft. at the extremities. The main columns from which the cantilevers spring are steel tubes 12 ft. in diameter, and all the compression and tension members in the structure are proportionately large. The work to be done was so unique in its great magnitude that special tools were in many cases designed for it. There are 45,000 tons of steel employed in the bridge. Its cost was £1,600,000.

In many cases it is desirable to have the bridge movable, entirely or in part, as in the neighbourhood of docks, canals, etc. The chief kinds of bridges designed for such purposes are draw-bridges, swing-bridges, traversing-bridges, and pontoons. In the first case the bridge is able to open by having part capable of turning upwards about a horizontal axis. Such drawbridges or *bascules* were in use centuries ago across the moats of old castles. Swing-bridges open by turning about vertical pivots; traversing-bridges open by sliding backwards along one of the abutments. Pontoons are floating bridges built along a series of flat-bottomed boats of iron anchored firmly in position. The Tower bridge across the Thames is the largest bascular bridge in the world. Two masonry towers divide the water-way into three parts. The central part contains the double-bascule, and gives an opening 200 ft. wide and 135 ft. high when the bascule is up. The side spans are of 270 ft. each, and are half-suspension in design. The cost was over £1,100,000. It was completed in 1894.

Bridge, a game of cards which attained extraordinary popularity in fashionable society in England at the end of the 19th century. It is played by four players, and somewhat resembles whist.

Bridgeport, city and port of Connecticut, U.S., at the mouth of the Pequannock, which flows into Long Island Sound. It is 57 miles N.E. of New York. It affords good harbourage for small vessels, and has a considerable coasting trade. It has pleasant surroundings. Its chief industries are the manufacture of carriages, harness, machinery, metal cartridges, and sewing machines.

Bridget, ST. 1. An Irish saint (453–523). She entered a convent at 14, and during her life founded four monasteries. Her name in its form of St. Bride is also to be found in England.

2. A Swedish saint (1302–1373). She was of the Swedish royal blood, and married young. With her husband she made pilgrimages to St. Olaf at Drontheim, and to St. Iago of Compostella. In

1344 her husband died, and she devoted herself to the religious life. She founded a new Order (Augustinian) with some additions of her own, and there were 74 monasteries of this order established in Europe. In 1349 she established a hospice for Swedes in Rome, and after a pilgrimage to Palestine she returned to Rome, where she died. She was canonised in 1391.

Bridgetown, capital of Barbadoes, on the west coast of the island, and along the north side of Carlisle Bay. A breakwater called Mole Head protects the inner harbour. Bridgetown was founded in 1628, and is said to have derived its name from an Indian bridge in the neighbourhood. By a singular coincidence it was almost burnt down in the year of the great fire of London, and again just 100 years after (1766). In 1831 a hurricane greatly damaged it, and in 1845 there was another fire. The Bishop of Barbadoes lives here, and the town possesses colleges, schools, a barracks and arsenal.

Bridgewater, Francis Egerton, Duke of (1736–1803), chiefly remembered as the introducer of the English system of canals. In 1758 and the following years he had constructed from the designs of Brindley the Bridgewater canal from Worsley to Manchester and Runcorn. A tunnel brings the canal out of the cliff at Worsley from the pits into a kind of open dock. The aqueduct that carried the canal over the river at Barton Moss was considered a wonderful piece of engineering, but is now superseded by the swing aqueduct which is opened for the passage of masted vessels along the Manchester Ship Canal. It was, however, curious to see a horse towing a barge along the river, and to see at the same time another horse towing another barge overhead at right angles to the course of the river. The Duke had such faith in his canal scheme that he embarked in it all his wealth, and the result justified his confidence. The canal is now the property of the Manchester Ship Canal Company, who gave close upon two millions for it.

Bridgewater, Francis Henry Egerton, Earl of (1758–1829), son of the Bishop of Durham, succeeded as eighth earl 1823, and died unmarried 1829. He is chiefly remembered as the originator of the Bridgewater treatises. He had left £8,000 for the author of the best treatise *On the Power, Wisdom, and Goodness of God as manifested in the Creation*. The money was, however, in the discretion of the executor of the bequest bestowed upon the eight writers of eight separate treatises, which with different degrees of merit carry out the designs of their founder. Among these the most notable are, perhaps, that of Sir Charles Bell on the Hand, and that of Dean Buckland on Geology and Mineralogy. They are all to be found in Bohn's Scientific Library.

Bridgman, Laura, a celebrated and everywhere-quoted example of a deaf, dumb, and blind child who learned to read, reason, and to more or less enjoy life. She was born in 1829, in New Hampshire, United States. There was nothing abnormal about her till her second year, when a fever destroyed her sight, hearing and smell, and partially taste. It was not till the age of eight that a serious attempt was made at an institution for the blind to educate her. The success of this attempt was so notable that Laura Bridgman may be said to have marked the beginning of the new era of education for deaf-mutes, which has advanced of late years to a point of perfection not even dreamt of at the beginning of the 19th century. Laura Bridgman made herself useful as a teacher of the blind and deaf and dumb. Dickens gives an interesting account of her in his *American Notes*.

Bridgnorth, town and municipal borough of Shropshire, 19 miles S.E. of Shrewsbury. Of the two parts into which it is divided by the Severn, the Lower is on the river, the Upper is on a rocky sandstone height about 180 feet above the bank. There was formerly a fortress on this height, but only a fragment of it now remains. The town formerly sent two members to Parliament, and from 1868 till 1885 it still sent one. The chief industries are carpet and worsted making. There are two parish churches and a grammar school of Henry VIII.'s time. The castle was demolished and the High Town burnt by the Parliamentary forces during the Civil war. There is still to be seen a fine old Tudor house, which escaped the fire, and in this house Bishop Percy was born in 1728. Pop. (1901), 6,049.

Bridgwater, seaport and municipal borough in Somersetshire, six miles from the Bristol Channel (12 by river), and 29 miles S.W. of Bristol city. The river Parret divides the town, which is on the edge of the well-wooded plain which lies between the Mendip and the Quantock Hills. Ships of 700 tons can come up to Bridgwater, and a canal unites it with Taunton. There is a bore in the Parrett of 6 ft. or 8 ft., and the spring-tides rise 36 ft. The principal industries are bath-brick and cement making, carriage-building, and potteries. There is a church with a spire notable for its grace. The name is said to be a corruption of Burgh-Walter, from a certain Walter to whom William I. granted the manor. Bridgwater suffered much in the Civil war, and was one of the chief places to support Monmouth in his rebellion. It no longer sends a member to Parliament. Pop. (1901), 15,209.

Bridle, the instrument by which a horse is restrained, stopped, or guided. The use of *bridles* and *bits* may be traced as far back as the days of ancient Egypt and Assyria, and mention of a bridle bit is found in Xenophon. The ordinary bridle consists of a *head-stall* and a *snaffle-bit*. The head-stall is composed of a strap, which passes behind the ears, a front, which passes in front of the ears, a nose-band, a throat-band, and cheek-pieces. The *bit* is the most important part of a bridle. The different varieties of bits are almost numberless, but most of them are constructed either on the principle of the *snaffle* or on that of the *curb*, or a combination of the two. The snaffle-bit consists of two bars jointed together in the middle, and is prevented from being pulled through the mouth by two perpendicular bars attached at each end and by a

pair of rings. It is connected with the reins and head-stall by means of two more rings fastened at each end. The *curb-bit* consists of two cheek-pieces and a mouth-piece, with a curve in the centre known as the port, and a chain which is attached to the cheek-piece, so that when the curb reins are pulled the chain presses on the animal's chin, and draws down its lower jaw. The bearing-rein used in driving is a rein attached to the bit; its object is to divide the weight on the driver's hands. It is very frequently abused. Other forms of bridles and bits are the Weymouth, the Pelham, the Dwyer, the Chifney, etc. *Blinkers*, which form a part of the driving-bridle, are pieces of leather attached to the cheek-pieces of the head-stall to prevent the horse being easily startled by anything at the side or behind him.

Bridlington, town of Yorkshire in the E. Riding, 23 miles S.E. of Scarborough and six miles S.W. of Flamborough Head. Bridlington is supposed to have been a Roman station, and the nave of the church is part of an ancient Augustinian priory of much importance. Bridlington Quay, one mile S.E. of the old-fashioned town, is the port of the town, and is a watering-place of some renown, with the usual accompaniment of sands, parade, and gardens. There is also a chalybeate spring. The bay has good anchorage, and stone piers enclose the harbour. The sea-view is often enlivened by vessels making for the anchorage at Flamborough Head. During the Civil war Bridlington was cannonaded on account of Queen Henrietta, who took shelter here. The town gave the title of Earl of Bridlington to the Boyles, Earls of Cork. Beyond a corn trade, Bridlington has no special industry. Pop. (1901), 12,473.

Bridport, in Dorset, 16 miles from Dorchester, and two miles from the English Channel, at the junction of the Asker and the Brit. The harbour, at some distance from the town, will admit ships of 250 tons burden, and there is some foreign and coasting trade. The town consists mainly of two streets at right angles to each other, and it has a town hall and an interesting church. Before the Conquest Bridport was of much importance, and possessed its own silver mint; but now almost its only industry is rope and cordage making. Pop. (1901), 5,710.

Bridport, Alexander Arthur Hood, first Viscount, one of the most distinguished of British naval officers, was born in 1727, and having entered the navy at an early age, became a lieutenant in 1746, and commander and captain in 1756. In 1757, with the *Antelope*, 50, he fought and drove ashore the *Aquilon*, 48; in 1759, in the *Minerva*, 32, he was present at Sir Edward Hawke's crushing defeat of De Conflans; and in 1761, in the same ship, he re-took the *Warwick*, 60, in a manner which gained him the highest credit. In 1778 he commanded the *Robust*, 74, in Keppel's unsatisfactory action with d'Orvilliers, off Ushant, and again by his gallantry brought himself into prominent notice. In 1780 he was promoted to be rear-admiral, and two years later he commanded a division of Lord Howe's fleet for the relief of Gibraltar. In 1783 he was second in command at Portsmouth, in 1788 he entered Parliament for Bridgwater, and was made a K.B., and having in 1787 been promoted to vice-admiral, he was second in command in the Channel under Lord Howe at the outbreak of war in 1793. In the following year he became admiral, and, with his flag on the *Royal George*, was second in command in the great victory of the glorious First of June, 1794. His ship had 20 men killed and 72 wounded. For this service he was made an Irish peer by the title of Baron Bridport. In 1795, holding this time an independent command, he defeated the French off Groix on June 22nd, and took the *Formidable*, *Alexandre*, and *Tigre*. In 1796 Lord Bridport was made vice-admiral of England and an English peer, and from 1797 to 1800 he held chief command in the Channel. In 1799 he was made lieutenant-general, and in 1801 general of marines, and in the last-mentioned year he was also raised to the rank of a Viscount. He died in 1814, without issue, although he had been twice married. He was elder brother of Samuel, first Viscount Hood (q.v.).

Brief, in legal phraseology, means a statement or epitome of the facts of a litigated case with a reference to statutes or decisions of the courts supposed to be applicable as indicating the law bearing on such facts. It is prepared by the plaintiff's or defendant's solicitor, and is delivered to his counsel for his instruction and guidance in conducting the case before the court. It is the practice to endorse on the brief the fee to be paid to the counsel or advocate, which is usually paid on delivery, or the solicitor becomes responsible to the counsel for the same, quite irrespectively of the result of the case. [Barrister.]

Brieg. 1. Prussian town of Silesia, 25 miles S.E. of Breslau, and on the left bank of the Oder. The general direction of Silesian mines and workshops is here, and its chief industries are weaving, metal button making, sugar refining, trading in cattle, and cultivating chicory and tobacco.

2. A town at the foot of the Simplon Pass, in the Valais, Switzerland.

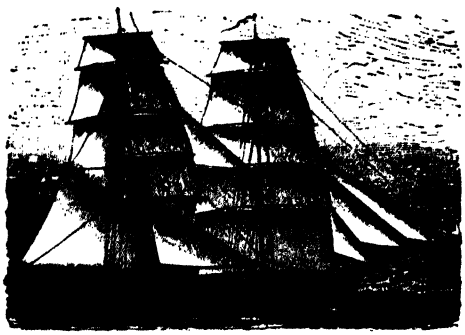
Briel, in South Holland, 12 miles W. of Rotterdam, and on the island of Voorne, near the mouth of the Maas, on the left bank. It is fortified, and its people are chiefly occupied in pilotage and fishing. It was the cradle of the United Netherlands' liberty, for the taking of it by the refugees in 1572 was the first act of open revolt against the Spanish rule. The admirals de Witt and Van Tromp were born at Briel.

Brienne-le-Chateau, French town in the department of Aube, and on the right bank of the Aube, 35 miles N.E. of Troyes. Napoleon was at the military school here for five years, and here he was defeated in 1814.

Brienz, town in Switzerland, at the foot of the Brienzergrat (Bernese Alps), on the N.E. of the lake of Brienz, and 30 miles from Berne. It is of wood, with picturesque houses, and from the cemetery may be had a good view of the lake, with the Giessbach and other falls, and of the snowy peaks

of the Faulhorn. The town is chiefly noted for its wood carvings, its cheeses, and its tourists. The church is on a rocky height, there are the ruins of a castle, and the Planalpbach fall is at the back.

Brierly Hill, Staffordshire town, 2¼ miles N.E. of Stourbridge. The neighbourhood produces coal, fireclay, and iron, and there are brick works, collieries, glass works, iron works, and potteries.



BRIG.

Brig, a two-masted vessel, square-rigged on both masts.

Brigade, a portion of an army under the command of a *brigadier*, an officer whose rank, which, in the British army, is only temporal or local, is next to that of a major-general. He is generally the senior colonel of a number of battalions which have been formed temporarily into a brigade. In the British army a brigade of infantry contains from three to six battalions; a cavalry brigade—three or more regiments. The term is also applied to the household troops, as the *Household Brigade*, and to the *Rifle Brigade*, which is composed of the four battalions of rifles. A *brigade-major* performs duties in a brigade analogous to those of an adjutant (q.v.) in a regiment.

Brigade-Major, BRIGADIER. [BRIGADE.]

Brigands. [MAFIA, BUSHRANGERS, DACOITS.]

Brigantine, a two-masted vessel, square-rigged only on the foremast, and fore-and-aft rigged on the mainmast.

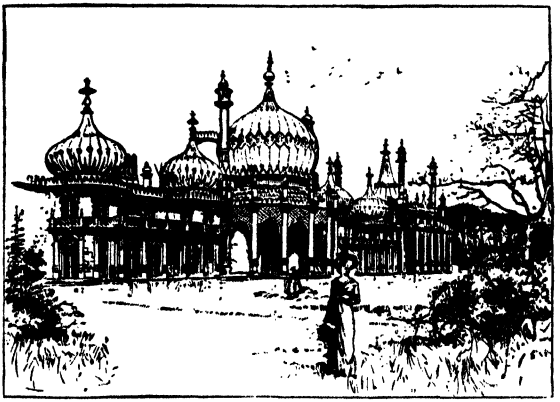
Briggs, HENRY (1561–1631), an English mathematician, born at Warley in Yorkshire, and educated at Cambridge, where he graduated B.A. (1581), M.A. (1585), and was elected to a fellowship (1588). He became Linacre lecturer (1592), in 1596 first Gresham lecturer in geometry, and first Savilian professor of geometry at Oxford in 1619. He was renowned for his improved systems of logarithms as compared with Napier's—an improvement admitted by Napier himself—and also for a treatise on the North-West Passage.

Bright, JOHN, English politician (1811–1889). His father was a cotton-spinner and manufacturer of Rochdale, at which town John Bright chiefly resided. A member of the Society of Friends, he was educated at their schools at Ackworth, Newton, and York. He first came into political prominence owing to his co-operation with Cobden in the Anti-Corn Law League and the Free Trade agitation of 1839. In July, 1843, he represented Durham in Parliament, and at once began to establish a reputation. In 1847 he was returned for Manchester, joined with Cobden in the movement for financial reform, and in 1852 aided in the reconstruction of the Anti-Corn Law League, to advance the cause of Free Trade. He also, with Cobden, was opposed to the Crimean war. Having been rejected by Manchester, in consequence of his temporary retirement through ill-health, he was returned for Birmingham in 1867, and had a hand in the overthrow of Lord Palmerston's Government. After the Indian Mutiny John Bright was in favour of transferring the Indian possessions to the Crown. In the American struggle he was an energetic and constant advocate of the North, and the Electoral Reform Act of 1867 owed much to his efforts. In 1868 he became president of the Board of Trade, but was forced by ill-health to retire in 1870. In 1873 he was again in office, and again in 1881, but in 1882 he retired from office over the Egyptian question. After that he appeared little in public, especially as he was strongly opposed to Mr. Gladstone's Irish policy. His death in 1889 caused universal regret, since not only was his eloquence greatly admired, but all parties had learned to value the moderation of his opinions in later years, and to respect the sturdy independence and sincerity of his character. As an orator he ranks high for the singular purity of his language and nervousness of style.

Bright, RICHARD (1789–1858), an English physician, born at Bristol, studied at Berlin, Edinburgh, and Vienna, and was connected with Guy's Hospital. He is chiefly known as having contributed much to the knowledge of obscure diseases of the system, especially to those particular phases of kidney disease since known by his name. He also wrote a book of travels in Lower Hungary, in which he gives an account of the Gypsies.

Brighton, a parliamentary and municipal borough and one of the "Queens of Watering-places," of which there are as many as of the gypsies. It is just above 50 miles from London, of which it is at the present day as much a suburb as Croydon or Sutton, being hardly more distant by rail, and possessing over other suburbs the advantage of the sea-breeze and some other good qualities of sea-side places. Brighton in its present aspect is almost the growth of the past hundred years, even its name only dating from about 1800, up till when it was the little fishing-village of Brighthelmstone. About the middle of the 18th century, a Dr. Russell brought it into notice as an easily accessible spot for sea-bathing, and the discovery of a chalybeate spring contributed to bring it into popularity. The fact of the then Prince of Wales taking a fancy to the place, and making the notorious Pavilion his residence, completed its claims to fashionable notice. But it was the construction of the Brighton railway, and the easy

accessibility from London, that have made it a place of popular as well as fashionable resort, and during the last forty years it has advanced by leaps and bounds; and bricks and mortar have already crawled inland so far as to swallow up the pretty outlying village of Preston, and along the coast westward almost far enough to make a continuous line to Kingston and Shoreham. Its spread due east is stopped by the Downs, which end in cliff, and have thus far marked the limit of building. Roughly speaking, Brighton may be said to have from three to four miles of sea-front, protected by a sea-wall of varying height, but rising at the east end to the height of 60 feet. Under the eastern part of the sea-wall is a promenade called the Madeira Road, of about a mile in length, and well sheltered by the wall and cliff from cold winds. There is a fine parade extending the whole length of this sea-front, and except for the presence of the sea, there is little to distinguish it from London, the shops towards the eastern part closely resembling those of Regent Street, and the squares and terraces of the western part being the counterpart of fashionable West End London. The town is clean, well paved and lighted, and its sanitary conditions are well looked after by the authorities. The sewage is carried by an elaborate system of intercepting sewers into the sea at a considerable distance eastward of the town. Of the two piers, the older, called the Chain Pier, which was supported by chains from iron columns which rested on oak piles driven into the chalk, was swept away by a very severe gale in December, 1896. In the matter of public buildings Brighton contains nothing strikingly remarkable, unless it be the fantastic Pavilion, the best feature of which is the Dome, which does not fall far short in its proportions of that of St. Paul's Cathedral. The associations with the Pavilion were not such as to endear it to the present Royal family, and many years since the buildings became the property of the corporation of Brighton, who have utilised them for various public purposes. Those who may have visited the Dome about 30 years ago, when it was used as stables for the cavalry stationed there, and have since attended a concert beneath it in later years, will probably think that the change has been for the better. The resemblance of Brighton to London would not be complete, did not the former possess some of the monster hotels which are a feature of our latest civilisation. But there are also some good old-fashioned hotels possessed of many almost historical associations. The Brighton Aquarium has for years been renowned as a well-arranged place of instruction, as well as amusement, and has been the model in its main points for many similar ones at watering-places and elsewhere. Till lately Brighton had its one well-managed theatre, but now it is getting theatres and music halls, as becomes a London-on-Sea. Of the many churches, St. Nicholas, the mother church, is the only one with any pretensions to anything like antiquity. St. Paul's was a good deal heard of a few years ago, but more for its interest as one of the homes of the then new High Church movement than for any other reason. Brighton possesses the usual complement of hospitals, and other public buildings; and, of course, abounds in schools, where many another besides Paul Dombey and Mr. Toots have been taught or crammed. Of these, Brighton College is not without renown in the scholastic world. As a sea-side place merely it is comparatively tame and monotonous. But when all else is cold and cheerless, one may sit sheltered by glass at the end of the West Pier, and look out upon the many-smiling water in a climate akin to that of Ventnor, while in half an hour one may be at the top of the South Downs and buffeted by a breeze as keen and bracing as can be desired. It is in its nearness to the unrivalled scenery of the country lying immediately beneath the northern escarpment of the Downs, and to its remarkably pure air, that Brighton owes its charm, at least for those who do not find it sufficient charm to carry about with them a bit of their beloved London. Old Brighton or Brighthelmstone, which now lies at varying depths beneath the beach under the east cliff, found its enemies in the Spaniards, Flemings, and others, as well as in the sea which finally swallowed it up. This last enemy was also formidable to the new town, but has been almost circumvented by the construction of the sea-wall above mentioned, and by a thorough system of groynes, which counteract the ceaseless movement of the shingle eastward. Brighton has an excellent water supply, which is drawn from the chalk of the South Downs. The population in 1901 was 123,478.



THE PAVILION, BRIGHTON.

Bright's Disease. A name given to certain affections of the kidney. Dr. Blackall (1771–1860) first pointed out the frequent association of dropsy with a diseased condition of the urine (albuminuria), and following up the line of investigation pursued

by Blackall, Dr. Richard Bright in 1836 demonstrated that the cause of the albuminous condition of the urine in cases of dropsy was traceable, in many instances, to inflammation of the kidneys. In the healthy body the albuminous substances in the blood and tissue fluids do not pass through the epithelium of the Malpighian corpuscles (q.v.) and urinary tubules (q.v.), and consequently the urine contains no albumen. When the epithelial cells are injured, however, in disease, they lose their power of keeping back the albumen, and albuminuria results. The term Bright's Disease is a convenient one, and is still applied to certain inflammatory affections of the kidneys.

Acute Bright's Disease. Acute parenchymatous or tubular Nephritis. Here the whole kidney is at times inflamed, though in some instances there may be a tendency for the epithelium of the tubules or of the Malpighian corpuscles to be specially involved. The most common cause is scarlet fever, after which disease albuminuria is apt to appear just when it is thought that convalescence is established. Again it may result from exposure to cold, or may be associated with pregnancy. The chief symptoms are albuminuria, dropsy and lumbar pain. The urine is scanty, high-coloured, and may contain blood; dropsy is usually first recognised as a puffiness of the eyelids. There is slight feverishness, headache and nausea, and vomiting may occur. All degrees of severity are met with in the disease; the albuminuria may never be considerable and may pass off entirely in a few days. More frequently a prolonged convalescence will be necessary, acute nephritis being very liable to leave chronic mischief behind it. Death may occur from œdema of the lungs or glottis, inflammation of serous membranes or uræmia (q.v.). The treatment consists in keeping the patient quiet and warm in bed, promoting the action of the skin, administering saline purgatives, applying counter irritation to the loins, and administering a slop diet, encouraging the drinking of simple fluids with a view to the diuretic effect they may produce.

Chronic parenchymatous Nephritis is probably in most cases a sequela of the affection just described. It is characterised by considerable enlargement of the kidney with fatty degeneration, the epithelium of the tubules being particularly involved. The urine is scanty, of high specific gravity, contains much albumen and granular or fatty "casts." Dropsy appears early, marked anæmia usually develops, and inflammatory affections, dropsical effusions or uræmia may supervene.

Chronic interstitial Nephritis (cirrhosis of the kidney) presents many points of contrast with parenchymatous nephritis. To begin with, as the names imply, in the one case it is the tubules and glomeruli, *i.e.* the parenchyma of the organ which suffer, in the other case the interstitial connective tissue is primarily involved, and its cicatricial contraction only secondarily affects the parenchyma. Again, in interstitial nephritis the amount of urine passed is usually in excess of the normal amount, and of low specific gravity, the amount of albumen contained in it may be very small, dropsy is not an early symptom, and the kidney diminishes instead of increasing in size, and is red and granular, not pale and smooth. The most important point to be noted about interstitial nephritis is its association with general vascular changes, particularly hypertrophy of the heart and thickening of the walls of the arterioles. These related conditions may, indeed, give rise to symptoms and so first direct suspicion to the kidneys. For example, an attack of cerebral hæmorrhage or the discovery of certain changes in the eye recognisable by means of the ophthalmoscope may afford the first hint of interstitial nephritis. The causes of cirrhosis of the kidneys are obscure. It is generally met with in men past the prime of life, is often associated with gout, and perhaps with the abuse of alcohol.

Chronic Bright's Disease, when unmistakably established, too often only admits of palliative treatment. Hence the paramount importance of the utmost caution after scarlet fever, and after even the mildest form of the acute disease. To deal with the treatment of symptoms is impossible here; it may be mentioned, however, that three drugs, opium, mercury, and cantharides require to be used, if at all, with the greatest caution in Bright's Disease.

Brihuega, a town in the province of Guadalajara, New Castile, Spain, on the river Tajuña, 20 miles N.E. of Guadalajara. It was here in 1710 that the rear-guard of Lord Stanhope's army was captured by the Duc de Vendôme. There are some factories for linen and woollen goods.

Bril, PAUL, born in 1556, at Antwerp, accompanied as a boy his brother Matthew to Rome, where the latter was employed in the mural decorations of the Vatican. Paul took up this task on his brother's death, and was employed constantly by Sixtus V. and the next two popes. He excelled in landscapes with figures, possessing an admirable eye for broad effects, but was inclined to excessive softness of touch and too free a use of green. *Tobias and the Angel*, *The Wayfarers to Emmaus*, and *Syrinx transformed to a Reed* are some of his most famous works in oil. He died in 1626.

Brill (*Rhombus lævis*), a food-fish of the same genus as the turbot (q.v.), but smaller in size, rarely exceeding eight pounds in weight, and of less delicate flavour. The upper side is dotted with reddish spots. The brill is common on the coasts of Britain and the continent of Europe.

Brillat-Savarin, ANTHELME, was born at Belley, in 1755, and, having taken up law as a profession, became a member of the constituent assembly, and held several judicial appointments. In 1793 he fled from the Terror to America, but returning in 1796, held a judgeship at the court of appeal until his death, in 1825. He wrote a few works bearing on law and politics, but his fame rests on the *Physiologie du Goût*, a treatise on gastronomy, full of wit and learning, which appeared anonymously after his death.

Brimstone, or roll-sulphur, consists of sulphur (q.v.), mostly that obtained from pyrites, melted by a gentle heat and cast into sticks or rolls.

Brimstone Moth (*Rumia cratægata*), a common English moth of a brimstone-yellow colour with some reddish-brown spots. The caterpillar is generally found in white-thorn hedges.

Brindaban, or BINDRABAN, an ancient town on the river Jumma, in the North-West Provinces of British India, 6 miles N. of Muttra. It possesses several temples, to which thousands of Hindus make annual pilgrimages, and, as at Benares, the river banks are lined by ghâts, or ranges of steps. There are also three tanks held in high veneration, and several interesting buildings.

Brindisi (classic *Brundusium* or *Brundisium*), an ancient fortified port in the province of Lecco, standing at the head of a bay in the Adriatic 45 miles N.E. of Taranto. It was an important harbour in the best days of Rome, being the port of embarcation for Greece and the Levant. Horace describes his journey thither (*Sat.* i. v.), and Virgil died there on his way home from Megara. Many of the Crusaders sailed thence to Palestine. For a long period it sank into neglect, and the harbour became choked up, but in 1870 the route to India *viâ* Marseilles being closed by the war, it was selected as the starting-point of the British mail-steamers, and has served that purpose ever since. It is connected by railway with Turin, Rome, and Naples, and the accommodation for shipping, though still defective, has been greatly improved.

Brindley, JAMES, was born near Chapel-le-Frith, Derbyshire, in 1716, and in his early years followed the humble trade of millwright, in which he earned considerable local reputation. This led to his employment (1754) by the Duke of Bridgewater in the construction of his famous canal, and his services were next engaged in the connection of the Severn with the Grand Trunk Canal. His success in these and similar undertakings put him at the head of this branch of the engineering profession, and he was consulted in all the projects for linking together by water the chief industrial centres of the kingdom. He was quite uneducated, and overcame difficulties by rough and ready common-sense, rather than by scientific resources. It is said that when he had to face any task of more than usual magnitude, he went to bed and remained there until he had thought out his plans. Exhausted by a succession of arduous labours, he died prematurely in 1772.

Brine-springs, springs saturated with common salt (q.v.) or sodium chloride (NaCl), often in association with other substances, occur especially in districts where there are underground deposits of rock-salt (q.v.) from its solution by percolating spring waters. Sometimes, as in Cheshire, where the affluents of the river Weaver have found their way into old salt mines, it may be simpler to pump the salt to the surface as brine than to mine it as a solid. In the states of New York, Virginia, Ohio, Michigan and Kentucky salt is largely obtained from springs, and such waters may issue from deep-seated Triassic deposits, as apparently at St. Clement's, Oxford, and perhaps at Swindon, Wilts, far from their outcrop. Brine is commonly pumped over faggots to precipitate any carbonate of lime it may contain.

Brinjal. [AUBERGINE.]

Brinvilliers, MARIE MARGUERITE, MARQUISE DE, the daughter of Dreux d'Aubray, a respectable French official, was born in 1630. She married the Marquis de Brinvilliers, but soon left him for a lover, Gaudin de Sainte-Croix, an officer of cavalry. The latter had learned from an Italian the art, then very fashionable, of preparing secret poisons, which probably had arsenic as their base. He communicated this knowledge to his mistress, and together they got rid of her father, her two brothers, and her sister, with a view to obtaining their property. In 1670 Sainte-Croix killed himself whilst experimenting, and his papers revealed the crime. Madame de Brinvilliers fled to Liège, and took refuge in a convent, but a police-officer in the guise of an abbé contrived to bring her back to Paris, where, after terrible tortures, she was beheaded in 1676.

Briquette, the name given to a kind of fuel made of coal-dust and pitch compressed together.

Brisbane, the capital of Queensland, Australia, was founded in 1825 as a penal settlement, and derived its name from the then Governor of New South Wales. It is picturesquely situated on the river Brisbane, about 25 miles from its mouth in Moreton Bay, and 500 miles N. of Sydney. In 1842 it was thrown open to free colonists, and in 1859, when the district was erected into a separate government as Queensland, it was chosen as the capital. The river divides North from South Brisbane, and is spanned by the handsome Victoria swing bridge, a quarter of a mile in length. Kangaroo Point and Fortitude Valley are also districts of the city, which has grown with scarcely less rapidity than marked the rise of Melbourne or Sydney, though it is rather a centre of trade and agriculture than of mineral industries. It is the seat both of an Anglican and a Romanist bishopric, and possesses fine cathedrals and churches. The houses of legislature, the vice-regal lodge, the post-office, and the school of art are fine public buildings. The waterworks, a highly-important matter in a semi-tropical climate, are admirable, and all the other institutions of a colonial capital, such as banks, hospitals, museum, and colleges, exist here. Railways communicate with various parts of the colony, and there are regular lines of steamers running to Sydney and to the northern ports.

Brisbane. 1. SIR CHARLES, a British naval officer of distinction, the fourth son of Admiral John Brisbane, who died in 1807, was born in or about the year 1769, and having entered the service in 1780, was a midshipman in the *Hercules*, 74, at Rodney's action on April 12th, 1782, off Dominica, and was wounded. In 1790 he was promoted to be lieutenant, and in 1793, in the *Meleager*, he was present at the operations at Toulon, and subsequently at those on the coast of Corsica. At the siege of Bastia he served under Nelson, and received a severe head wound, which involved the almost

total loss of the sight of his left eye. In 1794 he was promoted by Lord Hood to be commander of the *Tarleton*, and in her he was present on March 14th, 1795, in Lord Hotham's action off Genoa; and in the following year, in the *Moselle*, he was able to obtain for Lord Keith the information which led to the capture, in Saldanha Bay, on August 18th, of three Dutch ships of the line, two frigates, and four other vessels. For this service he was posted into the *Dortrecht*, 66, one of the prizes, though his official commission, dated July 22nd, 1796, was to the *Nemesis*. He was afterwards despatched in the *Oiseau*, 36, to cruise off the River Plate, where he most gallantly fought and beat off two Spanish 38-gun frigates. Having returned to the *Dortrecht*, he distinguished himself by his personal courage in quelling a mutiny on board, and, in consequence, he was transferred to the *Tremendous*, another mutinous ship, in which he was equally successful. In the *Doris*, 38, he assisted the *Beaulieu* and *Uranie* in cutting out the French ship *Cherrette*, in July, 1801. Thenceforward, for several years, he served in the West Indies, capturing the *Mignonne* and other vessels, and, as captain in 1805 of the *Arethusa*, 38, obtaining most valuable information concerning the movements of the enemy. In 1806, assisted by the *Anson*, he captured the Spanish frigate *Pomona*, 38, and destroyed nine out of twelve gunboats which were with her, and a castle under the guns of which she had sought refuge. Once more Captain Brisbane was wounded. Next year, at the head of a small frigate squadron, he very brilliantly attacked and captured Curaçoa, a service for which he was rewarded with a knighthood, a medal, and an augmentation of arms. In 1808 he was made governor of St. Vincent, in 1815 a K.C.B., and in 1819 a rear-admiral. He died in 1829.

2. His brother, SIR JAMES, fifth son of Admiral John Brisbane, was born in 1774, and entered the navy in 1787. He was signal midshipman of the *Queen Charlotte*, 100, flagship of Lord Howe on the glorious First of June, 1794, was promoted in the same year to be lieutenant, and as such was present at the reduction of the Cape of Good Hope and at the capture of the Dutch squadron in Saldanha Bay. For these services he was in 1796 made commander. In 1801 he assisted in buoying the channel preparatory to Nelson's attack on Copenhagen, and being in that year posted, he was appointed to the *Saturn*, 74, flagship in the West Indies. In the *Belle-Poule*, 38, he captured the *Var*, 32, under the guns of Valona, and assisted in the reduction of Zante, Santa Maura, etc., besides making many prizes. He served for many years in the Mediterranean, always with distinction, and in 1816 was Lord Exmouth's flag-captain in the *Queen Charlotte*, 108, at the bombardment of Algiers. He had already, in 1815, been made a C.B., and he was now knighted. He died in 1829 from the effect of disease contracted while he was employed in command of the flotilla engaged in the Burmese war.

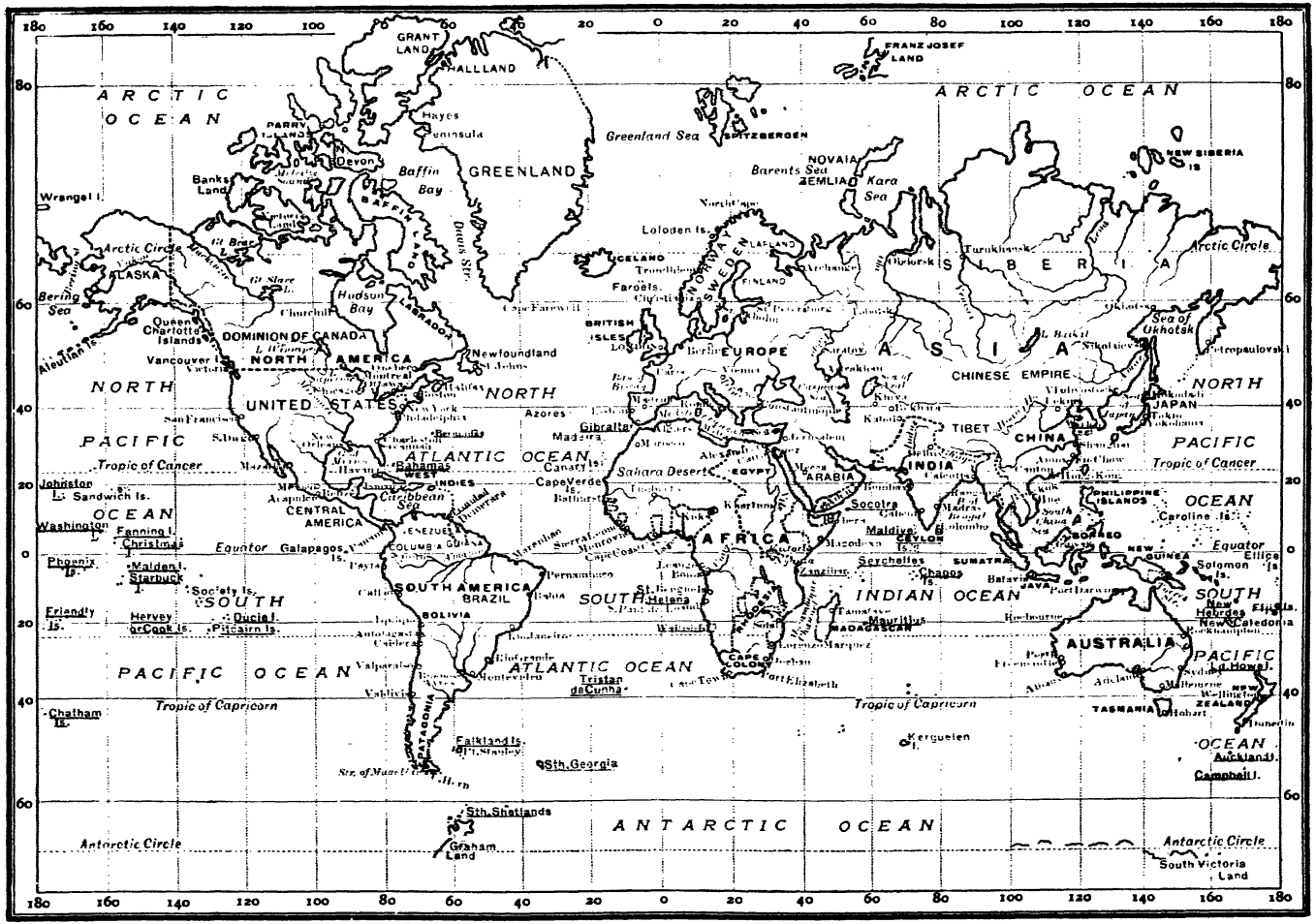
3. Another son of Admiral John Brisbane, namely, WILLIAM HENRY, who died in 1796, was a captain in the navy.

Brisbane, SIR THOMAS MACDOUGAL, was born near Largs, Ayrshire, in 1773, and entering the army, served with high distinction in Flanders, the Peninsula, North America, and elsewhere. In 1821, after holding several colonial appointments, he was sent out as Governor of New South Wales. Here he discharged his official duties with zeal and success, but his great achievement was in the field of science. He established at his own expense the astronomical observatory at Paramatta, and made a catalogue of the stars of the southern hemisphere, for which he received the Copley medal of the Royal Society. On his return to England he resumed his work at Makerstown, and his magnetic investigations proved of great value. He succeeded Sir Walter Scott as president of the Royal Society of Edinburgh, and died in 1860.

Brisinga is a genus of STARFISH found off the north coast of Norway by Asbjörnsen, and named by him after the breast ornament of the goddess Freya. It differed from all the living Starfish then known, by the possession of a central disc sharply marked off from the arms, while it has neither eyes, ampullæ (*i.e.* the reservoirs which regulate the water supply to the tube feet), nor dermal branchiæ (the processes from the upper side of the body which play so important a part in the respiration of most Starfish). In these points, and also in the arrangement of the reproductive organs, etc., it differs from the Starfish and agrees with the Brittle-Stars (q.v.). It was therefore regarded as intermediate between these two classes, and has been made by some authors the type of a special order. It was also regarded as a close ally of some extinct genera of the Palæozoic (q.v.) era. Many forms referable to the family *Brisingidæ*, of which this genus is the type, were found in the Challenger Expedition, and it is now agreed that *Brisinga* is a degraded rather than a primitive starfish. [*See* ASTERIAS for terms, etc.]

Brissot, JEAN PIERRE, the son of a pastrycook at Chartres, France, was born in 1754, and destined for the law, but he took to journalism and politics, editing the *Courrier de l'Europe* at Boulogne. When this was suppressed he settled in Paris and published his *Theory of Criminal Laws*, and other works inspired by Rousseau, with the result that he was imprisoned in the Bastille. He then went to England and started a democratic paper, which was seized, and he subsequently visited Holland and America. In 1789 he returned to Paris, brought out *Le Patriote Français*, and, becoming a member of the Commune, drew up the famous petition for the abolition of royalty. Being elected to the Legislative Assembly and the Convention he actively supported the wars with Austria, England, and Holland (1792–93), and founded a party—the Brissotins—which stood halfway between the Girondists and the Montagnards, opposing the excesses of the latter. Robespierre, incensed at his policy, ordered his arrest, and he was guillotined in 1793. His *Memoirs* and *Political Will* were published forty years later.

Bristol, a city and port on the river Avon, six miles from its mouth, stands on the borders of



MAP OF THE BRITISH EMPIRE.

Gloucestershire and Somerset, but by a charter of Edward III. forms a county in itself. It existed probably in Roman times, and is sometimes identified with Caer Brito, one of the earliest cities of Britain. It appears in Domesday Book, and the castle that was founded by Geoffrey Mowbray, Bishop of Constance, and enlarged by Robert, Earl of Gloucester, existed up to 1654. From the time of John to Charles I. the town and castle were an appanage to the Crown, and played some part in the political and religious struggles of the 15th and 16th centuries. Meanwhile its trade, especially with the West Indies and America, had grown important, and both John and Sebastian Cabot started thence on their memorable voyages. The exactions of Charles I. drove the city to encourage the Rebellion, and in 1643 it was captured by Prince Rupert, but subsequently recaptured by Fairfax. Colston, whose "day" is annually kept by both political parties, was a munificent public benefactor at the close of the 17th and beginning of the 18th century, and Southey was a native of the place. Burke was member for Bristol from 1774 to 1780. In 1793 a serious local riot caused some loss of life, but far more severe was the outbreak in 1831, nominally in support of the reform movement. The *Great Western*, the first steamer ever built for Transatlantic service, was launched here in 1838. Ten years later Bristol became a free port, and with the improvement of its docks and quays it has recovered from the shocks to its prosperity caused by the abolition of slave-trade and slavery, and the development of Liverpool. The tonnage now entering the port amounts to nearly a million and a half of tons, nearly three times as much as in 1847. The city is intersected both by the Avon and its tributary the Frome, and in its streets are many relics of its great feudal lords, the Earls of Gloucester, the Berkeleys, and the Gaunts, and of its wealthy merchants, such as the Canynges, the Shipwards and the Framptons. The cathedral, originally a church of Austin Friars, 1148, was partly rebuilt in 1877, but retains its fine choir, gateway, and chapter-house, one of the most perfect Norman buildings extant. St. James's, St. Philip and Jacob's, St. Stephen's, and St. Mary Redcliff are noteworthy specimens of architecture. The latter, in the Perpendicular style, was founded by William Canynge in 1375, and was pronounced by Queen Elizabeth "the fairest and most famous parish church in England." Chatterton (q.v.) pretended that he found the Rowley poems in a chest preserved in the muniment room. There are the Cathedral school, the grammar school, Queen Elizabeth's hospital, the Red Maids school and various other educational institutions. Muller's Orphan Asylum, accommodating 2,000 children, deserves mention. The see of Bristol was created in 1540, was united to that of Gloucester in 1836, and disunited in 1897. The Hot Wells, so famous at the end of the 18th century, and immortalised in *Evelina* and *Humphry Clinker*, are now deserted, but an effort is being made to revive their popularity, whilst in their vicinity has sprung up the pretty suburb of Clifton. There is a complete service of electric tramways. Population (1901), 328,842.

Two other Bristols are found, both in the United States. (1) A town on the Delaware river in Pennsylvania, the terminus of the Delaware Canal, and a place of some commercial and industrial importance. (2) A port in Rhode Island on Narragansett Bay, where ship-building, sugar-refining and the making of rubber goods are carried on.

Bristol Channel, the deep indentation on the south-west coast of England, which is formed by the estuary of the Severn, between South Wales and the counties of Devon and Somerset. It extends inland for 80 miles, varying in breadth from 5 to 43 miles, and having a depth of from 5 to 40 fathoms. No inlet in Britain is so large, or so powerfully affected by tides, which rise occasionally to 70 feet, and meeting the outflow of some rivers produce a *Bore*, which is a source of danger to small vessels. The shores are mostly steep and precipitous, especially on the southern side. Caermarthen, Swansea, Cardiff to the N., Bideford, Ilfracombe, Minehead, Porlock, and Bridgwater to the S., are the chief harbours, and the rivers Towy, Taff, Usk, Wye, Avon, Axe, Parret, Taw, and Torridge, besides the Severn, discharge their waters into it. Lundy Island lies at its mouth, and some smaller islets obstruct the fairway between Bridgwater and Cardiff bays.

Britannia, the name by which Great Britain was known to Cæsar and subsequent Roman writers. Its origin is doubtful, but we find Aristotle speaking of the *Nesoi Brettanikai*, Albion and Ierne, as if the word were familiar at that time. The attempt to connect it with a Welsh *brith*, meaning "tattooed," is fanciful. When Cæsar invaded the country, the inhabitants, except a few settlers from Belgium on the coast, and perhaps some remnants of a primitive Euskarian race, were Kelts, and he probably came into contact only with the Cymric branch, the Gadhelic being settled in the more remote north and west. They appear to have been split up into tribes, very loosely federated, and the influence of the Druids, or priestly caste, was considerable. They wore their hair long, dyed their bodies with woad, clothed themselves in skins, and lived chiefly on milk and flesh. The Romans, even after four centuries, did but imperfectly civilise these people, though a hundred years sufficed to break the military resistance of Cassivelaunus, Caractacus, Boadicea, and other chiefs. Claudius (43 A.D.) first made Britain a Roman province, which was under one prefect. Severus (210) divided it into two parts, Brit. Superior, and Brit. Inferior. In Diocletian's time there were four provinces, 1. Brit. Prima, S. of Thames. 2. Brit. Secunda, S. of Dee and W. of Severn. 3. Flavia Cæsariensis, E. of Severn. 4. Maxima Cæsariensis, N. of Humber and S. of Tyne. In 368 Valentia, including the S. of Scotland as far as the wall of Antoninus, was added for a short time. We know little from historical records of the Roman government, but remains still extant prove that much comfort and even luxury was introduced by the conquerors, whilst Christianity was the recognised state religion as early as 324 A.D. Eboracum (York), Deva (Chester), and Isca (Caerleon) were the headquarters usually

of a legion. There were at least fifty-six *colonia* or *municipia*, and Eboracum and Verulamium (St. Albans) enjoyed Roman citizenship. Of the break up of this government and the confusion that ensued, until a Teutonic race established itself as supreme, we are in almost total ignorance. The Roman occupation practically came to an end in 410, and with it Britannia ceased to exist, except as a mythological personification in classical attire, for use as an emblem of national greatness.

Britannia Metal, an alloy consisting chiefly of tin and antimony, very malleable, and easily cast, largely used for manufacture of spoons, teapots, etc.

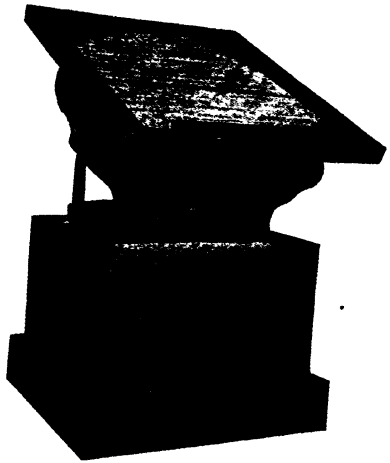
British Association FOR THE ADVANCEMENT OF SCIENCE, a society founded mainly by Sir David Brewster, in 1831. As its name implies, its object is to assist the progress of discovery, to make known the latest results of scientific investigation and research, by bringing together eminent men belonging to all the various branches of science. Meetings are held annually, a different town being chosen each year; all the principal towns in England, as well as Montreal, in Canada, have at various times been the meeting-places. Lectures, excursions, soirées, conversaziones, form a contrast to the more serious portion of the business. The society is divided into eight sections: (1) Mathematical and Physical Sciences; (2) Chemical Science; (3) Geology; (4) Biological Sciences; (5) Geography and Ethnology; (6) Economic and Statistical Sciences; (7) Mechanical Science; (8) Anthropology. Among the former presidents of the Association may be mentioned Professor Huxley, Professor Tyndall, Sir Frederick Abel, etc. etc.

British Columbia, together with Vancouver Island (q.v.), forms a province of the dominion of Canada, British America. It extends northwards from the 49th parallel of latitude, which marks the boundary of the United States, and lies between the Pacific Ocean on the W., the Rocky Mountains on the E., and Alaska to the N., having a total area, including Vancouver and Queen Charlotte Islands, of 341,000 square miles. Until the colonisation of Vancouver Island in 1849 it possessed no history. The settlers soon afterwards spread to the mainland, and until 1871, when it was incorporated with Canada, the territory was a Crown colony. The name of British Columbia was given in 1856. The climate is excellent, and milder than the Atlantic coast on the same parallels. The harbours are numerous and convenient, and the soil in many parts is exceedingly fertile, and abounds in mineral wealth, gold being largely found over nearly the whole area. Coal, silver, iron, and copper are extensively worked in many districts. Valuable timber grows both on the islands and the coast. The Canadian Pacific Railway, with its terminus at Vancouver, on Burrard Inlet, has recently done much to open up these resources. From the Rocky Mountains flow numbers of impetuous rivers, of which the Fraser, with its affluent the Thompson, is the largest, being navigable for 90 miles. The Pease river and the Skrena are farther north, and the southern portion is drained by the Columbia. There are several narrow mountain lakes. Victoria, the capital, with its suburb Esquimault, is on Vancouver Island, as is also Nanaimo, the seat of the coal trade. New Westminster, another thriving town, stands at the mouth of the Fraser river, in the Gulf of Georgia. The fisheries are the richest in the world, and the export of tinned salmon exceeds £300,000 per annum. The province is administered by a governor, an executive council, and a legislative assembly, and sends three senators and seven members to the Dominion Parliament.

British Museum. The germ of the present Museum was the collection of MSS. formed by Sir R. Cotton, and left by his grandson to the nation in 1700. In 1753 the rich collection of MSS. and curiosities belonging to Sir Hans Sloane, and the MSS. collected by Robert Harley, Earl of Oxford, were left to the nation on condition of payments very much below their real value. An Act was accordingly passed to purchase these and to provide a general repository for them and the Cottonian library, the money being raised by a lottery. The trustees appointed for the purpose acquired the ducal residence of Montagu House in Bloomsbury, which was then for sale, and the collections, thenceforward entitled the British Museum, were opened to the public early in 1759. The acquisition in 1816 of the Elgin Marbles, and in 1823 of the Royal library, rendered an increase of space imperative; and in the years 1823–45, Montagu House was gradually pulled down and replaced by the main portion of the present buildings, designed by Sir R. Smirke, and arranged in a hollow quadrangle. The side facing Great Russell Street was adorned with a columnar façade, the pediment being occupied with sculpture by Westacott. To meet the great increase in the number of books, the present reading room was erected in the centre of the Quadrangle, after the plan of Sir A. Panizzi. In 1880 the enormous increase of the natural history and archæological collections led to the removal of the former to the Natural History Museum in Cromwell Road, South Kensington. Even then some of the departments suffered from want of room, but by the aid of a bequest from Mr. William White, which came into the hands of the trustees in 1879, a new gallery was built to hold the Mausoleum Marbles, and a new wing fronting Montagu Street, called the White Wing, giving space for a newspaper reading room, for the department of prints and drawings, and other purposes. A new story was constructed in 1891 over one of the rooms devoted to Greek antiquities, and serves as an extension of the department of coins and medals.

An account of the Museum by departments follows.

The Department of MSS. had its origin in the Harleian, Cottonian, and Sloane collections, to which have been added, among others: the Old Royal MSS. (1757); the King's MSS., collected by George III.; the Birch MSS. (by the Rev. Thomas Birch, D.D.); the Lansdowne MSS. (of the Marquess of Lansdowne); the Arundel MSS. (of the Earl of



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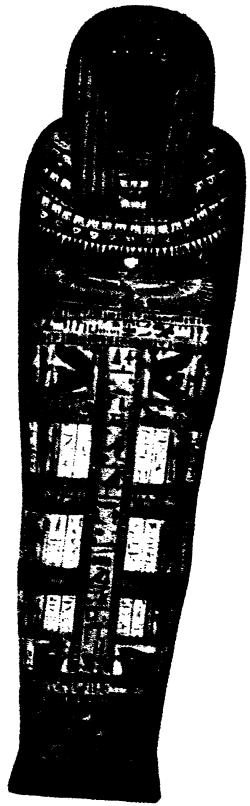

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1. THE ROSETTA STONE. 2. PAINTED WOODEN INNER COFFIN OF PEN-AMEN-NEB-NEST-TAUI, FROM THEBES, XXVITH DYNASTY—ABOUT B.C. 550.
3. MUMMY OF ARTEMIDORUS; FAYYÛM. ABOUT A.D. 200; PRESENTED BY H. KENNARD, ESQ. 4. THE PORTLAND VASE.

BRITISH MUSEUM.

Arundel); the Burney MSS. (of the Rev. Charles Burney, D.D.); the Hargrave MSS. (of Francis Hargrave, Q.C.); the Egerton MSS. (of the Earl of Bridgewater); the Stowe MSS. (of the Marquess of Buckingham); and the "Additional" MSS., a large collection made up of miscellaneous purchases, donations, and bequests. The department contains upwards of 55,000 volumes and about the same number of rolls and charters, besides 10,000 seals and casts of seals; and one of its chief treasures is the unique MS. of the lost *Treatise on the Constitution of Athens*, ascribed to Aristotle, which was discovered on a papyrus brought from Egypt in 1889.

The Department of Printed Books had its nucleus in the collections brought together in 1753, to which have been successively added: the Old Royal Collection, formed by English sovereigns from the time of Henry VII., and including the libraries of Cranmer and Isaac Casaubon; the Civil war and Commonwealth Tracts, over 30,000 in number, collected by the Royalist bookseller Thomason, and after many strange vicissitudes presented by George III. in 1762; the collection of plays bequeathed by David Garrick in 1779; the choice collection of the Rev. C. M. Cracherode, bequeathed in 1799; that of Sir Joseph Banks, mostly works of natural history, acquired in 1820; the large library formed by George III. and presented by George IV. in 1823, now known as the King's Library; and the very valuable library of the Right Hon. Thomas Grenville, received in 1847. Besides these additions, the operation of the Copyright Act, passed in 1842, which gives the Museum the right to a copy of every book published and offered for sale in the United Kingdom, adds largely to the library; many books are received by copyright from the Colonies, and by exchanges with foreign nations, and by gifts from all parts of the world, and considerable sums (at present about £10,000 a year) are devoted to purchases.

The Library is computed to contain about 2,000,000 volumes. The annual increase of volumes from all sources amounts to about 46,000, exclusive of newspapers (which number about 3,000), music (about 4,000) and continuations. This rate of progress will, in a few years, place the Museum first in point of size among the libraries of the world, and ahead of its only rival, the Bibliothèque Nationale at Paris.

A catalogue by authors' names has been made of the whole library, pamphlets included. In 1901 the printing of this from the MS. volumes was completed, comprising about 600 folio volumes.

The Antiquities of the Museum were formed into a separate department in 1807, and in 1861 into the three departments of Greek and Roman Antiquities, Coins and Medals, and Oriental Antiquities with British and Mediæval Antiquities and Ethnography. In 1866 the latter became a distinct department. The chief components of the antiquities collections have been: the collection made by Sir William Hamilton while ambassador at Naples, purchased in 1772; the sculptures collected by Mr. Townley, including the celebrated Townley Venus, purchased in 1805 and 1814; the sculptures from the Parthenon at Athens, collected by the Earl of Elgin and bought of him in 1816 for £35,000; the Phigaleian marbles purchased in 1815-16; the marbles, coins, and bronzes bequeathed by Mr. Payne-Knight in 1826, and then valued at £60,000; the marbles from Lycia, found by Sir Charles Fellows in 1845; the remains of the Mausoleum in 1845; and those of the Temple of Diana at Ephesus, excavated by Mr. J. T. Wood. Most of these collections contained coins, which have been added to from the Bank of England and India Office collections, and other sources.

Egyptian antiquities were almost unrepresented in the Museum till 1801, when a quantity collected by the French in Egypt were handed over by them after the capitulation of Alexandria. Among these was the celebrated Rosetta Stone, bearing a Greek inscription, with translations in hieroglyphics and in the popular (demotic) Egyptian character, thus forming a key to the deciphering of those characters.

The Babylonian and Assyrian collections have been brought together in modern times by the exertions of Sir H. Layard, Sir H. Rawlinson, and others.

The Semitic antiquities are as yet few. The department of British and Mediæval Antiquities has been formed of: the Slade bequest, chiefly of glass; the Henderson bequest of pottery and oriental weapons; the Burges and Meyrick collections of armour; a large and curious collection of watches, clocks, and keys, bequeathed by Mr. Octavius Morgan; the Franks collection of pottery and porcelain; the Christy collection (formerly exhibited in Great George Street, Westminster) of prehistoric archæology; and Canon Greenwell's collection of antiquities from British barrows.

The Ethnographical collection is based on Captain Cook's collection, the Christy collection, and the objects found by Lord Lonsdale on his Arctic expedition.

The Department of Prints and Drawings is one of the richest collections in Europe; its resources are but faintly shown in the historical exhibition of sketches and drawings of all schools which are on view.

The Natural History collections took their rise from the Sloane collection, and steadily increased till, in 1860, it was resolved to separate them from the rest. A new Museum was erected at a cost of £325,000, in Cromwell Road, South Kensington, on the site of the Exhibition of 1862, and the removal took place during 1881–86, the first gallery being opened April, 1881. Here are to be found all "products of natural forces," while objects "that show the effect of man's handiwork" are kept at Bloomsbury. Sciences such as chemistry, which cannot be studied to advantage without experiment, find no place in the Museum. Its collections fall under the three heads of Mineralogy, Botany and Zoology, and Geology (*i.e.* palæontology). In the fine Entrance Hall of the Museum is an Introductory Collection, showing by types the scientific classification of natural objects, and serving as a key to the whole.

Brittany, the old French province forming the extreme N.W. corner of France, now comprised in the five departments of Ille et Vilaine, Côtes du Nord, Finistère, Morbihan, and Loire-Inférieure. Clay-slate, schist, and granite are the prevailing rocks. Lead and silver mines have been worked near Rennes, at Huelgoat, and elsewhere, and a curious mineral, staurolite, occurs at Pleyben. A chain of hills, the Montagnes Menez, an offshoot of the central watershed of France, runs through the country from E. to W., forming eventually two branches, the Montagnes d'Arrée (N.) and Montagnes Noires (S.), whose highest points are somewhat over 1,200 ft. Spurs of these ranges run down to the coast, which is very rocky, and on the W. has fine cliff scenery resembling that of the Channel Islands. It is much indented by inlets, on which nearly all the ports are situate. Brest harbour and the Morbihan are the largest. The latter, a remarkable enclosed archipelago in the extreme S.W., contains a multitude of islands (365 according to local report), a few of which are inhabited, and some fifty cultivated. Some of the tidal currents between them run from nine to thirteen knots per hour. The principal rivers (apart from estuaries) are the Ille, Vilaine, and Blavet, which are canalised and navigable. The scenery of the Rance is well known. Nantes and its port, St. Nazaire, are just within the province. Rennes, Brest, and Lorient are large modern towns: St. Malo, an important seaport; Vannes, Quimper, Morlaix, Hennebont, Treguier, of special interest to the antiquary. Dinan and St. Servan, near St. Malo, are resorts of English residents, while there are several well-known watering-places near the latter town. Large tracts, especially in the interior, are barren heath and upland, and there are several large forests, among them those of Quénécan and Loudéac. Wolves still exist, and are regularly hunted. But there is much very fertile land; buckwheat and millet are among the cereals most frequently grown; flax, too, is grown in some quantities, and the dairy produce is very important. Brittany butter is largely exported to Paris and England. Potatoes and other early vegetables are largely grown for export—the latter near Roscoff, on the N. coast, in the 18th century the centre of the smuggling trade with England. Direct trade with England is mainly conducted through St. Malo, which is also largely engaged in the Newfoundland fisheries. On the W. coast the sardine fishery is important, while lobsters and cray-fish are caught and stored in salt-water tanks for export, several thousand at a time being sometimes in store at Roscoff, as also at Concarneau. At the latter place is a well-known establishment for fish culture. The oyster beds of Auray and elsewhere are important. There are many good trout streams, but little is done to preserve the fishing.

Brittany contains the most numerous and striking examples of MEGALITHIC MONUMENTS (q.v.), especially near Locmariaquer and Carnac. It exhibits even now striking survivals of an earlier world. Large districts are purely Keltic in blood, as they were till quite lately in speech. The Breton or Brezonec, a Keltic tongue akin to Gaelic and Welsh, probably revived by immigration from Cornwall in the 3rd century A.D. (*see below*), has at least four dialects, and a large ballad literature, partly collected by M. de Villemarqué (*Barsaz Breiz*, translated into English by Tom Taylor), but unfortunately somewhat adulterated in the collecting. The *Revue Celtique*, published at Paris, gives further information. Few parts of Europe have so much legend and folk-lore. The Arthurian legend is localised in Brittany as in Cornwall. fairies, witches, demons, play a large part in the popular creed; no part of France has been more Catholic, nor taken into the Catholic faith more of pagan tradition. Local saints and holy wells abound; the fisherman still believes that on All Souls' Day the spirits of the dead moan in the Baie des Trépassés (near the Point du Raz), and are ferried over to the Ile de Sein; idolatry was nominally abolished in Ushant only in the 17th century, and a little earlier a Gallo-Roman female statue, now at Quinipily, near Baud, was still worshipped with strange and obscure rites by the peasantry. Miracle plays survived into the 19th century; while the many "calvaries"—large solid stone erections, in the open air, supporting carved groups of stone representing the Crucifixion, and the many admirable cathedrals, as well as the superb churches of Creizker (at St. Pol de Leon) and the Folgoet near Landerneau, testify to the piety of the past, as the thronged "pardons" or pilgrimages do to that of the present. The most famous resort of pilgrims is the church of St. Anne d'Auray, which is most visited at the end of July, by peasants of all parts, often in costume. But every village almost has its "*pardon*." The great castles of Josselin (admirably restored), Tonquedec, Sucinio, Jugon, and Elven, and the abbey of St. Gildas de Rhuys, the retreat of Abelard, are also of much interest.

Gloomy, silent, passionate, and profoundly religious, the Breton has hitherto stood apart from the modern world. No part of France has so well preserved its ancient costume, male as well as female. The long matted hair, the pleated linen knee-breeches or "bragou bras," the broad felt hats and large plated buttons of the men, are often seen while the fanciful caps of the women, differing in every district, and the gay festal costumes, are ever more familiar from modern imitations. These caps conceal all the hair—whence much of the false hair worn has come from Brittany. Few parts of France have had stranger customs (though some of the stories about them must be received with caution). Marriages were often negotiated by the bazvalan, or itinerant tailor; the women, though as a rule kept strictly in subjection, in some districts enjoyed the privileges of leap year in perpetuity; while near Morlaix there is a tradition of an annual marriage fair where the marriageable maidens sat on the parapet of a bridge, and suitors passed them in review. The illiterate adults some years ago were over 50 per cent. of the population in some districts; while the box bedsteads, despite their elaborately-carved oak doors, the mud floors, and black bread of the cottage interiors, do not indicate a high civilisation. But the country is now intersected by railways which must soon destroy its old-world character.

History. In Cæsar's time the most important tribe was the Veneti (near Vannes), a very remarkable maritime people, who traded by sea with Britain. Their vessels had leather sails and chain cables. They revolted after submission to Cæsar, and were all but annihilated B.C. 56. Local names and Roman remains show that the country was partly Romanised. In the 3rd century A.D. numerous Britons migrated from Cornwall to avoid the Saxon pirates, and in 390 A.D. the native governor appointed by the Romans declared himself independent. Soon the country became a group of principalities, more or less under the suzerainty of the Lord of Rennes. Conquered in 799 by Charles the Great, its subjection to his successors was merely nominal. Their rights (such as they were) were ceded by Charles the Simple to the Dukes of Normandy. For the last half of the 12th century the suzerainty was contended for by the kings of England and France. About 1213 it definitely passed to the latter, despite the murder of Arthur, the young duke, by his uncle, John king of England. The long war of succession between Jean de Montfort and Charles of Blois (whose general, Du Guesclin, is the great hero of Brittany), 1341–1364, was marked by the heroic defence of Hennebont by Jeanne de Flanders, wife of De Montfort, till relieved by English troops under Sir Walter Manny. Charles of Blois fell at Auray in 1364, and the dukedom passed to the De Montforts. The marriage of the Duchess Anne with Louis XII. led to its union with the French crown. The privateers of St. Malo played an important part in the various wars with England. The atrocities of the Revolution [NOYADES] in no wise shook the Breton devotion to Catholicism. It was at Quiberon, in the S.W., that a body of Royalist exiles, with English aid, made a landing in 1795, but they were defeated, and the leaders shot near Auray. The "Breton mobiles" fought bravely in the Franco-German war of 1870, and at least half the families of Nantes, it is said, lost some members, Recent elections, however, indicate that the country is becoming Republican, and it must, no doubt, soon lose much of its distinctive character.

Brittle-Stars, the popular name for the "OPHIUROIDEA," a class of the ECHINODERMATA. This name has been applied to them owing to their habit of breaking off their arms when alarmed. They resemble the Starfish (class *Asteroidea*), in consisting of a central body, from which radiates a number of arms; but they differ from these (*cf.* ASTERIAS) in that the arms are sharply marked off from the body, whereas in the Starfish the central disc appears to be formed merely by the fusion of the bases of the arms. The number of these is more constantly five than in the Asteroidea. The structure of the arms is also very different in the two groups; thus in the Brittle-Stars they are more slender, and lack the furrow along the under-side; further, they do not contain any prolongation of the stomach, but are mainly occupied by a row of ossicles or joints. Pairs of small tube feet occur along the under-sides, but locomotion is mainly effected by the use of the arms as limbs. Other differences from the true starfish are the absence of an anus, and the fact that the "madreporite" (the perforated plate which filters the water that enters the water-vascular system) is on the under-side; there may, however, be several of these plates. Further, around the mouth there is a complex arrangement of ossicles which acts as a masticatory apparatus. The reproductive organs are a series of glands discharging their products into chambers around the mouth, known as "genital bursæ"; these also serve for respiration. In most cases the larva is a PLUTEUS (q.v.), a free-swimming form, with a skeleton like an ensel. In some cases, however, there is no such metamorphosis, and the young at birth resemble the parents, which are, therefore, viviparous. They have long been known to reproduce by "fission," or the growth of the whole animal from parts. The class "Ophiuroidea" is divided into three orders: the *Ophiurida*, including the common English forms; the *Euryalida*, a series with simple or branched, and very flexuous arms; and the *Protophiura*, an extinct group confined to the Palæozoic era.

Britton, JOHN, was born in a humble position near Chippenham, Gloucestershire, in 1771, and after being educated at the village school, was apprenticed to a tavern-keeper in London. His health broke down, and he took to literature for a livelihood, having a strong bent towards archæology and topography. In 1801 he produced in conjunction with Brayley, *The Beauties of Wiltshire*, and dealing with other counties in succession he completed the work known as *The Beauties of England and Wales*. His *Architectural Antiquities of Great Britain* appeared in 1805; his *Cathedral Antiquities of England* in 1825; and his *Antiquities of Normandy* in 1827. Brayley was once more his partner in the *History of the Houses of Parliament*, completed in 1836. Many other interesting pieces of descriptive writing came from his pen, and he did much to arouse a popular taste for antiquarian subjects. He died in 1857.

Brixham, a port and market-town at the S. extremity of Tor Bay, Devonshire, 23 miles from Exeter. Its inhabitants are principally engaged in fishing, the soles and turbots caught off that coast being highly esteemed. Marble and ironstone are also exported. William III. landed here in 1688, and a monument commemorates the event. The parish church, dedicated to the Virgin, is a good example of the Perpendicular style.

Brixton, a suburb in the S. of London, on the Surrey side of the Thames, and in the parish of Lambeth. Within the last half-century the district has been thickly built over, and is now the residence of many thousands of persons employed in the City or West End—rent being lower there than in most of the outlying quarters of London. Pop. (1901), 84,226.

Broach. [BARODA.]

Broad Arrow, a mark which is placed on Government stores, was originally the crest of Henry, Viscount Sydney and Earl of Romney, who was Master-General of the Ordnance from 1693 to

1702. The Broad Arrow is also placed upon buildings, stones, etc., to which special reference is made on the maps of the Ordnance Survey of Great Britain. The height above the sea of these marks is usually given on the maps.

Broadbill. [SHOVELLER.]

Broad-bottom Administration, a name applied to Pelham's ministry formed in 1744, because nine dukes were included among its members, who were supposed to represent all the powerful parties in the State.

Broads, THE, a local name given in Norfolk to the extensive shallow lagoons formed by the Bure, the Ant, the Yare, and other rivers in their sluggish course through a level country to the sea. In other counties they are called "meres." Surrounded by trees, overgrown with reeds and water-plants, and linked together by winding channels, they possess a quiet picturesque charm that has grown to be much appreciated of late years. Moreover, they abound with fish and aquatic birds. Navigation is carried on by means of "wherries," or broad-bottomed sailing boats with accommodation for the living and sleeping of several occupants. The chief of these lakes are Wroxham Broad, Bredon Broad, S. of Yarmouth, Hickling Broad (400 acres) near North Walsham, and Rockland Broad, 7 miles from Norwich. Hitherto there has been a free use of rights of way over them, but riparian proprietors are now beginning to assert their claims.

Broca, PAUL, was born in the department of Gironde, France, in 1824, and educated as a surgeon at Paris, where he became professor of pathology. He was an eminent practitioner, and wrote many works on professional subjects. His fame rests principally on his anthropological investigations. He was the founder of the Anthropological Society and *Reriew*, and the chief of French evolutionists. He died in 1880.

Brocade, a kind of silken stuff, with embossed gold or silken flowers or other ornaments upon it. The manufacture of brocades was established at Lyons in 1757. The term is now confined to silks figured in the loom, as opposed to those embroidered after the weaving.

Broch, BURGH, BRUGH (from *brough*, the Scots form of A.S. *burh, burg* = a fort, a fortified enclosure), local names for the Scottish round towers, which figure in old antiquarian works as "Picts' towers" or "Pictish towers," and which are known to the Gaelic-speaking natives as "duns." They are all constructed on one plan. The circular base is about 60 ft. in diameter; the walls are of Cyclopean masonry some 15 ft. thick, sloping inwards as they rise, and enclosing a central area, in some cases containing a well, and always open to the sky. There is a single doorway, sometimes with a guard-chamber at one side or on both sides in the thickness of the wall, in which are also contained the chambers, stairs, and galleries, and all the openings, with the exception of the doorway, look into the central space. Dr. Joseph Anderson, who dealt with the subject in his Rhind lectures (*Scotland in Pagan Times—The Iron Age*), estimates that there are about 300 of these erections still standing in the five northern counties of Scotland and in the northern and western islands; beyond this area very few are to be found. The typical broch is that of Mousa, on a small island to the E. of Shetland, to which Erling, about 1150, carried off Margaret, mother of Harold, the then Earl of Orkney, who laid siege to the place, but being unable to take it, consented to the marriage. This, though the upper part is gone, is in better preservation than any other broch; the remaining portion is about 40 ft. high, and has six galleries in the thickness of the walls. The brochs differ greatly from the round towers of Brechin and Abernethy, and from the Irish round towers, all which have much greater elevation in proportion to their base. Sir John Lubbock compared the Scottish brochs to the nuraghe (q.v.) of Sardinia. There is, however, little in common between them except their shape; in internal plan they are entirely different. These buildings are peculiar to Scotland, and though they are generally considered to be of Celtic origin and post-Roman in date, not one has been found elsewhere, nor is any edifice with similar characteristics known outside the region inhabited by Celtic races. No record exists of their erection, but they were probably intended as strongholds to which the peaceful agricultural population might retire, with their cattle, when the Northmen descended to plunder and slay. Within recent years these buildings have been examined, and, from the excavations made, objects have been obtained which show that the people who built and used the brochs were agriculturists and herdsmen acquainted with the use of iron, possessing brass and silver, of which they shaped ornaments which prove that they had made some progress in the arts.

Brocken, or BLOCKSBERG, THE (anc. *Mons Bructerus* or *Melibocus*), the highest point in the Harz Mountains, 20 miles W.S.W. of Halberstadt in Prussian Saxony. It has an elevation of 3,740 feet, and its sides are cultivated almost to the summit. The valleys send up occasionally columns of vapour, leaving the space at the top of the mountain clear, and at sunset or sunrise the shadows of persons on this plateau, being cast upon the bank of cloud, produce the phenomenon known as "The Spectre of the Brocken."

Brockhaus, FRIEDRICH ARNOLD, was born at Dortmund, N. Germany, in 1772, and well educated, especially in foreign languages. He first started a store for the sale of English goods at Dortmund, but in 1805 began business as a publisher in Holland. Political difficulties drove him back into Germany, and, settling at Altenburg, he took up the *Conversations-Lexicon*, as yet incomplete, and finished the first edition in 1811. This great encyclopædia has since been through twelve editions. In 1817 he moved to Leipsic and founded a large establishment from which were issued many important historical and bibliographical works, as well as various periodicals. He died in 1823, but the business was carried on by his sons.

Brodie, SIR BENJAMIN COLLINS, Bart., was born in 1783 at Winterslow, Wilts, where his father, the rector of the parish, a man of culture and character, directed his education. In 1801 he was sent to London, and began the study of anatomy under Abernethy. Though not at first fond of his profession, he worked at it with patient assiduity, and in 1808 became assistant-surgeon to St. George's Hospital, with which institution he was connected for more than thirty years. His fame as an eloquent teacher soon spread, and in 1810 he became a Fellow of the Royal Society, and next year received the Copley medal for his experimental investigations as to the connection between the nervous system and the diffusion of animal heat. His other contributions to physiology dealt with the influence of the nerves on the heart and the secretions. He now acquired an enormous practice as a consulting surgeon and operator, and may be said to have originated the modern system of conservative surgery, writing various treatises on pathological subjects. In 1834, after acting as medical adviser to three sovereigns, he was created a baronet, and in 1858 he was President of the Royal Society. He was also first President of the newly-instituted Medical Council. Retiring in his later years from active work, he published anonymously an instalment of an interesting discussion entitled *Psychological Enquiries*. He died in 1862. His son was an eminent chemist and professor of that science at Oxford. He died in 1880.

Brody, a town in the circle Zloczow, and province of Galicia, Austria. It was founded in 1679 under the name of Lubicz, and its proximity to the frontier gave it a large share of the trade with Russia and Turkey, so that a century later it was made a free commercial city. Jews form the bulk of the population, and it is known as the "German Jerusalem." The castle belongs to the famous Count Potocki.

Broglie, ACHILLE LÉONCE VICTOR CHARLES, DUC DE, a peer of France, was born at Paris in 1785. The family, of Piedmontese origin, had for two centuries served France with distinction in the wars of Louis XIV., the Seven Years' war, and the struggle against the Revolution. His father, however, had espoused republican principles, and sat in the constituent assembly, though his change of principles did not preserve him from death in the Reign of Terror. Young De Broglie was not deterred by his father's fate from his faith in liberalism. Called to the chamber of peers in 1815, he voted alone against the murder of Ney, and joined the party of which Guizot and Royer-Collard were the leaders, allying himself also with the English opponents of the slave trade. He married a daughter of Madame de Stael. After 1830, as minister of foreign affairs, and chief of the cabinet, he negotiated the Quadruple Alliance, aided in the settlement of Belgium and Greece, and strove to preserve the peace of Europe. In 1836 he retired permanently from official life, but gave his nominal adhesion to the Republic in 1848. He was a bitter, though impotent, foe to the Second Empire. His later years were devoted to literature and science, and he was admitted to the Academy, though his published works are not of very high merit. He died just before the outbreak of the war in 1870. His son, Albert de Broglie, has achieved greater fame as a writer, and has taken an active part in politics, having been head of MacMahon's cabinet in 1871.

Brogue, a light, coarse kind of shoe formerly worn by the Irish and the Highland Scots. The term is now more generally used of the peculiar accent of the Irish.

Broiling, the cooking of meat over hot coals or by placing it on a gridiron above the fire; the meat thus cooked is very nutritious.

Broke, SIR PHILIP DOWES VERE, Bart., born in 1776, entered the navy in 1793, and was present in 1795 at Hotham's two actions in the Mediterranean, and in 1797 at the battle off Cape St. Vincent. He became a commander in 1799 and a captain in 1801. In 1806 he commissioned the *Shannon*, 38, and in her, on June 1st, 1813, met, fought, and in a few minutes captured the United States frigate *Chesapeake*, 44, off Boston Lighthouse, after one of the most brilliant actions on record. Captain Broke, who was severely wounded, was made a baronet in 1813 and a K.C.B. in 1815. He became a Rear-Admiral in 1830, and died in London on January 3rd, 1841. No other single-ship action in history ever made so much stir in the world as that between the *Shannon* and *Chesapeake*. It was entered into by both combatants under exceptionally chivalrous conditions, and it was most furiously fought; and it resulted in the triumph of the weaker, but more disciplined ship, over the stronger, but less practised one.

Broken Knees. The "knee" of a horse, from its situation, is peculiarly liable to injury in the case of a fall. However slight the injury may appear, it demands careful treatment, as any lasting evidence of mischief in this part detracts from the value of the animal. If the joint be opened, lameness is almost sure to ensue, and if a fracture has occurred, the animal had better be destroyed.

Broken Wind, a disease of the horse in which laboured breathing is the prominent symptom, the difficulty being rather with expiration than with inspiration. It proves usually an exceedingly intractable form of disease.

Broker, in commerce, one who acts as an intermediary between buyer and seller, bringing them together, and charging them commission on the value of the goods sold for his trouble. Thus a stockbroker, while not holding stocks or shares for sale himself, knows where to look for such descriptions as his clients may wish to buy. In commerce, brokers usually confine themselves to one special department, such as cotton or iron, and here acquire special knowledge of service to their clients. [STOCKBROKER, SHIPBROKER, BILLBROKER.] Furniture brokers and pawnbrokers have obscured the original significance of the name by taking up other branches of business. In the City of London

brokers must be formally admitted by the Corporation, and pay a fee of £5 on admission and £5 per annum. A list of such "sworn brokers" is published annually. Brokers who convert to their own use property entrusted to them by clients are liable by statute to penal servitude.

Bromberg, the capital of a government of the same name in the province of Posen, Germany. Standing on the river Brake, it was in existence in the middle of the 13th century, and appears to have suffered at times from war, owing to its position near the frontier, but it also throve commercially through the same cause. It was taken by Prussia in 1772, and was restored to that country in 1815, having been assigned by the Treaty of Tilsit to the Duchy of Warsaw. The Bromberg Canal opens up communication between the Vistula, the Oder, and the Elbe, and railways connect the place with Berlin, Dantzig, and Warsaw. Woollen and leather goods, Prussian blue, tobacco, sugar, chicory, beer, and brandy, are produced, and there is a large transit trade.

Brome, ALEXANDER, born in 1620, and by profession an attorney, made some name as a cavalier song-writer. After the Restoration his verses, epistles, and epigrams were collected and published. He also translated Horace, and wrote a comedy entitled *The Cunning Lovers*. He died in 1666.

Brome, RICHARD, was originally a servant of Ben Jonson, but became his master's rival, though with some interval, as a comic dramatist. His *Northern Lass* drew from Jonson commendatory verses, and his fourteen other plays all display originality of plot and character. He was highly appreciated in Charles I.'s reign. He died in 1652.

Brome-grass, *Bromus*, a genus of grasses comprising about 140 species, mostly natives of temperate regions. Eight are natives of Britain. They have generally their spikelets in loose panicles, compressed and furnished with a long awn. The annual soft brome (*B. mollis*) is common in meadows, and the Australian Prairie-grass (*B. schräderi*) is a quick-growing forage plant.

Bromide of Potassium, a drug largely used in certain forms of nervous disorder. In sleeplessness it is sometimes of use, and has been found particularly valuable in cases where it is undesirable to administer opium; in sickness, particularly seasickness, it is also employed, and it has also been given to allay spasm in whooping-cough and asthma. The affection in which bromide is of most value is, however, epilepsy. In some patients it is absolutely curative, while even in the most refractory cases a course of bromide usually affords some relief. When taken in large doses for a considerable period the symptoms of "bromism" develop. A pustular eruption appears on the face, and the patient becomes dull and sleepy, and if the use of the drug is still continued, loss of memory and impairment of intelligence may result.

Bromine (Br. 80), a non-metallic liquid element discovered by Balard in 1826. Is not found free in nature, but occurs as *bromide* in marine plants, sea water, many saline springs, and in considerable quantities in the salt beds at Stassfurt. It is a dark red liquid boiling at 59° and possessing a very offensive smell (*βρωμος* = stench), the vapour being extremely irritating to the mucous membrane of the nose, mouth and air-passages. In its chemical characters it resembles *chlorine* and *iodine*. It combines with hydrogen forming a monobasic acid, *Hydrobromic acid*, the silver and potassium salts (AgBr., KBr.) of which are largely used in photography. It also forms oxyacids, which are not, however, of great chemical or industrial importance. [HALOGENS.]

Bromley, a market-town in Kent, 10 miles S.E. of London. The parish is very extensive, including Plaistow, Sundridge, Bickley, Widmore, and other villages. Standing on high ground above the Ravensbourne river, the place has during the last thirty years become a favourite residence, and the population grows rapidly. Bishop Warner's College, founded in 1666, provides a home for clergymen's widows, and the bishops of Rochester had a palace here, in the gardens of which was St. Blaize's Well—a mineral spring once in high repute. The church is Gothic and contains good monuments. The locality is served by the London, Chatham and S.E. Railway. There are several other villages and parishes of the same name in various parts of England. Pop. (1901), 27,358.

Brompton. 1. A western suburb of London included within the parish of Kensington, and lying N. of Chelsea and S. of the district popularly known as Kensington. The name, however, from a caprice of fashion is gradually dying out of use, South Kensington taking its place. Within recent years the semi-rustic houses with gardens, that sheltered a large artistic colony, have been swept away, to make room for more pretentious mansions. The Consumptive Hospital, the Hospital for Women, and the Roman Catholic Oratory are the chief public buildings in this neighbourhood, but the Art Department of the South Kensington Museum was formerly regarded as a Brompton institution.

2. A suburban ecclesiastical district carved out of the parishes of Chatham, and Gillingham, Kent, and almost wholly within the borough and fortified lines of Chatham. It contains the upper barracks and naval hospital, with other works and buildings.

There are three parishes and townships of this name in Yorkshire, one in Shropshire, and two in Somerset.

Bronchi. The trachea or windpipe, on its termination at the level of the third dorsal vertebra, bifurcates, and the two tubes into which it divides are called bronchi, right and left respectively. Each main bronchus is rather more than an inch in length, the right being placed more horizontally, and the left being somewhat narrower but a little longer than the right. At their termination these tubes in their turn subdivide, forming the smaller bronchi, until ultimately the smallest subdivisions called bronchioles communicate with the groups of air cells. [LUNG.] The main bronchi are almost

identical in structure with the trachea (q.v.); in the smaller divisions the cartilage is irregularly disposed, and the unstriped muscle fibres assume an increasing importance as a constituent of the lining wall of these smaller tubes. In the smallest bronchioles no cartilage is found. The mucous membrane of the bronchi is lined throughout with ciliated columnar epithelium.

Bronchitis. Inflammation of the mucous membrane lining the bronchial tubes. The prevalence of bronchitis in this country is testified to by the fact that more deaths are returned as being due to it than to any other form of disease. It must be remembered, however, that in many instances when death is attributed to it, the bronchial mischief is merely a complication superadded to some other disorder. Diseases of the heart and kidneys are especially apt to terminate fatally in this way, so in children are measles and whooping-cough; again, gouty and tubercular subjects are particularly liable to bronchitic attacks. Further, when bronchitis becomes chronic, changes of a permanent character are set up in the lungs [EMPHYSEMA], and in patients so affected the fatal attack is only the last link in a long chain of diseased processes. In fact, uncomplicated bronchitis is very rarely fatal, save in children and old people.

The disease often dates from exposure to cold, and the inhalation of irritant materials is doubtless a predisposing cause, but perhaps the most important factor is the existence of a tendency to bronchitis. The fact that each attack causes subsequent attacks to be of more and more frequent occurrence, causes immense importance to attach to the treatment of the first manifestations of the disease.

The symptoms are first *general* and secondly *local*. The general symptoms are those of fever; headache, chilliness, rise of temperature, accelerated pulse, thirst and loss of appetite, furred tongue and constipation. The general disturbance is more marked in acute than in chronic attacks. The local symptoms are cough and difficulty of breathing. The cough is at first dry, and then attended with mucous, and finally with muco-purulent expectoration. The secretion which accumulates in the tubes gives rise to the wheezing character of the breath sounds, and on the application of the stethoscope rhonchus and crepitation or mucous rales are heard. If the lungs become increasingly involved, lividity results from deficient aeration of the blood, perspirations break out, delirium and coma supervene, and the patient may die asphyxiated. Usually, however, after the lapse of a day or two, the breathing becomes more easy, the sputum gradually diminishes in amount, and the disease is at an end.

The most dangerous variety of acute bronchitis is that in which the smallest tubes are chiefly involved. This *capillary bronchitis*, as it is called, is most apt to affect children, and is often accompanied by little or no expectoration.

The treatment of bronchitis comprises the methods of dealing with an acute attack, and the hygienic rules to be observed by sufferers from the chronic form of the disease.

The first thing to which to direct attention in acute bronchitis is the kind of air which is inhaled by the patient. Confinement to one room should be strictly enforced, and the air of that room should be maintained, as far as possible, at a uniform temperature of 65° F. This necessitates, of course, either the careful management of the fire, or, what is far better, the employment of some form of slow combustion stove. Ventilation must be so regulated as to ensure a constant renewal of air without draughts; and, besides this, the atmosphere should be rendered sufficiently moist by the diffusion of steam throughout the room from a bronchitis kettle. Expectorant remedies, such as ipecacuanha and squills, are generally found useful, combined with either benzoin, tolu, senega, and a stimulant like the carbonate of ammonia, or some sedative, according to the condition of the patient. Counter irritation is often employed, and medicated inhalations frequently prove of service. Constipation is usually present, and a purge is generally beneficial at the onset of the disease. In severe attacks alcohol is invaluable and so is opium, but the latter particularly requires to be administered with much care, and should on no account be given save under the doctor's directions.

Chronic bronchitis is a disease in which much can be done if the patient's temperament and circumstances permit it. In cases where a winter cough has become a matter of course, it should be made an invariable rule to keep inside the house during the cold season of the year. This, or residence during the winter in some warmer climate than that of England, is a *sine quâ non* in the treatment of chronic bronchitis. If a stop-at-home policy is adopted, everything depends upon the patient's self-control; the temptation to venture out in the evening, just for once, if yielded to, often undoes all the benefit derived from the self-denial of months. Throughout the winter the bedroom temperature should be carefully regulated, and care taken that sufficiently warm clothing is worn at all times. The carrying out of rules of this kind will do more in chronic bronchitis than can be effected by all the specifics. Tonic remedies have, however, their place in the treatment of the disease, and iron, quinine, or cod-liver oil, are capable of producing much benefit in appropriate cases. Chloride of ammonium, too, is a drug of value in many instances.

Bronchocœle. [GOITRE.]

Bröndstedt, PETER OLUF, was born at Horsens, Jutland, in 1781, and having been educated at the university at Copenhagen, visited France and Italy, afterwards going to Greece with other archæologists. After three years of active research, the results of which were published, he came home to take the professorship of Greek at Copenhagen. With a view to completing his great work, *Travels and Archæological Researches in Greece*, he was sent as Danish envoy to the Papal Court (1818), and remained abroad until 1832, visiting England in 1826. He was now made

director of the royal museum of antiquities, professor of archæology, and ultimately rector of the university. He died through a fall from his horse in 1842.

Brongniart, ALEXANDRE, the son of an eminent French architect, was born in Paris in 1770. He began life as a soldier, but having a taste for natural history, became professor of natural history in the Collège des Quatre Nations and of mineralogy at the School of Mines. He was one of the earliest systematisers of geology. In 1800 he was appointed director of the porcelain works at Sèvres, and revived the decayed art of painting on glass, publishing in 1845 his *Traité des Arts Céramiques*. He is known as the author of the division of reptiles into Saurians, Batrachians, Chelonians, and Ophidians. In 1816 he was elected to the Academy, and in later years he made scientific visits to Switzerland, Scandinavia, and Italy. He died in 1847. Along with Cuvier he wrote the *Essai sur la Géographie Minéralogique des Environs de Paris*. His son ADOLPHE THEODORE (1801–76) was also a distinguished naturalist.

Bronn, HEINRICH GEORG, born at Ziegelhausen, Germany, in 1800, devoted his life to the study of nature, and produced several valuable works, the most striking of which are his *Universal Zoology* and *Lethæa Geognostica*. He was professor of physical and industrial sciences at Heidelberg, and afterwards zoological lecturer at Freiberg, and died in 1862.

Bronolythe, an explosive invented by M. Bela de Broncs, consists mainly of the picrates of lead, sodium, and potassium, with the addition of nitronaphthalin and soot.

Bronte, or BRONTI, a market-town in the province of Catania, Sicily, at the foot of Mount Etna. The territory, with the title of duke, was conferred on Lord Nelson by the Neapolitan king in 1799 in return for his services against the French. These descended through Nelson's niece to Lord Bridport, and still are attached to that title. The estates are famous for an excellent growth of wine and for the manufacture of woollen goods and paper.

Brontë, the name of three gifted ladies who were the daughters of the Rev. Patrick Brontë, a clergyman of Irish extraction, who held in succession several Yorkshire livings, settling finally, in 1820, at Haworth, a bleak moorland parish, where his family grew up.

1. CHARLOTTE, the third child, was born in 1816, and having lost her mother at the age of four and her elder sister five years later, she had at the outset of her life to take charge of her brother and two younger sisters, Emily and Anne, neglected as they were by their invalid and eccentric father. Cut off from society, the young people grew up amidst the harsh surroundings of their north country home in a strange fashion. They all of them possessed strong imaginations, and from their infancy began to weave fictitious narratives and commit them to paper. In 1831 Charlotte enjoyed a year's schooling at Roe Head, returning thither as teacher in 1835. After a brief experience of the life of a governess, she resolved to start a school, and from 1842 to 1844 went to Brussels with her sister Emily to learn French. On her return she found to her distress that her brother Patrick had sunk into a hopeless drunkard, and he died in 1848. Meanwhile the three sisters had developed a taste for poetry, and in 1846 contrived to publish a small volume under the pseudonyms of Currer, Ellis, and Acton Bell, but their efforts attracted little or no attention. Nevertheless they set to work, each separately, on the composition of a prose romance, the result being *The Professor* by Charlotte, *Wuthering Heights* by Emily, and *Agnes Grey* by Anne. Strangely enough, the two last found a publisher, but the first was rejected. Nothing daunted, Charlotte persevered, and in 1847 gave to the world *Jane Eyre*, through the firm of Smith and Elder. The success was immediate, for though critics hesitated, the public at once appreciated the realistic vigour and rugged, unconventional force of the unknown author, whose name was concealed until the publication of *Shirley* in 1849, by which time her two sisters and her brother were in their graves. Charlotte Brontë now became famous, but her early training and weak health made her shrink from society. In the retirement of her father's vicarage she slowly proceeded with what was destined to be her last work, *Villette*, which came out in 1853. The next year she married her father's curate, Mr. Nicholls, but in less than ten months the fatal seeds of consumption that had cut off all her sisters worked their ravages on her enfeebled frame, and she died on March 31st, 1855. *The Professor* was published after her death. As might have been expected, there is a morbid element in all that Charlotte Brontë wrote, and the bitterness of a strong, proud, sensitive, and disappointed nature gives her stories a flavour that is often highly unpleasant. At times she is so ignorant or careless of the proprieties as to become coarse, and occasionally she is open to the charge of melodramatic sensationalism. Still, she expresses with rare literary skill just those phases of female character that are least on the surface; her plots are drawn with no little dramatic ingenuity; and her descriptions of the scenes with which she was familiar can hardly be surpassed for brilliancy and truth. *Jane Eyre* will always rank as the best of her productions, though *Shirley* is more wholesome and more humorous, and *Villette* gives a deeper insight into the writer's own mind.

2. EMILY was rather a poet than a novelist. Unrestrained imagination is the chief characteristic of her one very remarkable book, *Wuthering Heights*, but the premature close of her career prevented the full development of her faculties.

3. ANNE must be regarded as in every way inferior to her elder sisters. Her only novel scarcely rises above the level of the ephemeral stories of the period, and gives little indication of true genius.

Bronteus, a well-known genus of Trilobites, the type of the family *Bronteidæ*, which is characteristic of the Upper Silurian and Devonian rocks.

Brontotherium, one of the huge elephant-like ungulates allied to *Deinoceras*, and less directly to the tapirs, found in the lacustrine deposits of the White River group of Miocene rocks in the upper Missouri region. They are classed by Marsh as *Deinocerata;* by Cope under the name *Amblypoda.*

BRONTEUS.

Bronze, an alloy in which copper and tin are the essential components. It was known to the ancients, and was largely used by the Greeks and Romans for statuary, coins, swords, bells, etc. Small quantities of phosphorus improve its quality for many purposes, and *phosphor bronze*, containing ¾ per cent. phosphorus, 90 per cent. copper, and 9 per cent. tin, is a very hard alloy used for axle-bearings, cog-wheels, etc.

Bronze Age, a term denoting a bygone condition of races among whom bronze was the chief materials for weapons and tools, or the period in which it existed. Such a condition was by no means universal, but seems to have prevailed at one time in a great part of Europe and Asia; when it did occur it almost always followed the Stone Age [FLINT IMPLEMENTS, NEOLITHIC, PALÆOLITHIC], and was followed by the Iron Age. It necessarily varied in duration, and some races seem to have passed from the use of flints directly to iron, as have some of the Pacific islanders in our own day. Moreover, when such a period did occur, it was not marked off sharply from that which preceded or followed it; the use of bronze lingered on—though at last only for ceremonial purposes—long after iron was known, as may be seen from many passages in Virgil and Ovid. In Europe the Bronze Age has been brought into prominence by discoveries in Denmark; the finds show marks of a higher state of culture than do those of the Stone Age, and progress may be traced in the bronze implements and ornaments. Tylor is of opinion that bronze was used, even when iron was known, on account of the ease with which it could be cast. Lubbock thinks that the "knowledge of metals is one of those great discoveries which Europe owes to the East," and that the use of copper was not introduced into our continent until it had been observed that "by the addition of a small quantity of tin it was rendered harder and more valuable."

Bronze Wing, BRONZE-WINGED PIGEON, a popular name for any bird of the genus Phaps, from Australia and Tasmania. They are of comparatively large size, with the wings generally long and strong, and having variegated plumage enlivened by brilliant metallic spots and markings. All are esteemed for the table. The common Bronze-wing (*P. chalcoptera*) has the general plumage brown, with oval copper-bronze patches on the wings (less marked in the female). The name is sometimes extended to species of Geophaps and Ocyphaps, both confined to Australia. *G. scripta* is the Partridge Bronze-wing, and *O. lophotes* the Crested Bronze-wing.

Bronzing, the process by which a bronze-like surface is given to an object, which may or may not be of metal. In the case of metals this is usually done by rubbing with various solutions, as dilute nitric acid, sal ammoniac and vinegar, verdigris and vinegar, etc. Wooden and plaster objects are generally bronzed by washing with a solution of water glass (sodium silicate), dusting on a bronze powder, shaking off the excess, and drying.

Bronzite, $MgO.SiO_2$, one of the rhombic pyroxenes, differs from augite (q.v.) in crystallising in the prismatic or rhombic system. It takes its name from its bronze-like lustre, intermediate between pearly and metallic. [LUSTRE.] It has a foliated structure and occurs in serpentinite. Bronzite is extremely infusible, being only rounded at the edges of thin splinters by the blowpipe flame, and it is, therefore, taken as 6, the highest standard in Von Kobel's scale of fusibility.

Brooch, an ornamental clasp worn on the dress, to which it is fastened by means of a pin. Its use is now confined to women, but among the ancient Celtic and Scandinavian races brooches were frequently worn by men. The use of brooches dates back as far as the early iron age; very beautiful specimens have been preserved, especially of early Celtic brooches, the Tara brooch, the Ugadale brooch, and the Hunterston brooch being among the most celebrated.

Brooke, HENRY, author, was born at the beginning of the 18th century, at county Cavan, where, at Rantavan, his father held lands. Coming to London to study law, he won the friendship of Pope, and in 1735 published his *Universal Beauty*, which is said to have furnished the groundwork of Erasmus Darwin's *Botanic Garden*. In 1739 appeared his tragedy *Gustavus Vasa*, which, after being rehearsed for five weeks preliminary to being produced at Drury Lane, was prohibited by the Lord Chamberlain. In 1740 he returned to Ireland, taking up his residence at Dublin, where he was appointed barrack-master, and where he wrote numerous works. He also appears to have been the first editor of the *Freeman's Journal*, founded at Dublin in 1763. He died in 1783 in a state of mental decay. *The Fool of Quality*, republished in 1859 with a preface by Charles Kingsley, is the only one of his works which can be said to be known to-day.

Brooke, SIR JAMES, Rajah of Sarawak, was born in 1803 at Benares, where his father was in the Bengal civil service. At the age of sixteen he was appointed a cadet in the East India army, and served in the Burmese war, where he received a wound in the lungs. In 1830 he resigned his post in the service of the East India Company, and after his father's death in 1835, when he inherited £30,000, he sailed in 1838 for Sarawak in Borneo. He assisted the Sultan's uncle, Muda Hassim, of Borneo, in putting down some rebel tribes, and was rewarded with the title of Rajah of Sarawak in 1841, the

former rajah being deposed in his favour. He thenceforth set himself vigorously to work to reform the natives, made head-hunting a capital offence, got them to abandon their lawless and piratical mode of life, and to devote themselves to agriculture and trade. His efforts were strikingly successful, the chief town of his province under his administration growing from a place of 1,000 inhabitants to a place of 25,000, and its exports to Singapore rising from £25,000 annual value to £300,000. He finally returned to England in 1863, and in 1868 died at Burrator, Devonshire, being succeeded in the government at Sarawak by his nephew, Charles Brooke.

Brooke, STOPFORD AUGUSTUS, divine, was born in 1832 in Letterkenny, Donegal. He studied at Trinity College, Dublin, became incumbent of St. James's chapel in 1866, chaplain-in-ordinary to the Queen in 1872, minister of Bedford chapel, Bloomsbury in 1875, and in 1880, from conscientious scruples, severed himself from the English Church. Besides sermons, he has published a *Life of Frederick Robertson of Brighton, Theology in the English Poets, English Literature,* and *Milton.*

Brook Farm, a socialistic community based on Fourier's principles, was organised in 1840 by George Ripley. The farm, about eight miles from Boston, covered an area of 200 acres, and those who went to occupy it were educated men and women, who made up their minds to do each their own share of the work. Among them was Nathaniel Hawthorne, whose *Blithedale Romance* is an account of the little colony.

Brookite, a crystalline form of oxide of titanium, TiO_2, specific gravity 4·2; yellowish colour or colourless, and metallic lustre. Its crystalline system is not well established, either rhombic or monoclinic. This oxide is remarkable, as it crystallises in two other distinct forms, *anatase* and *rutile* (q.v.).

Brooklyn, a city of the United States and capital of King's county, New York state, stands on the west end of Long Island. The East river, a strait about three-quarters of a mile wide, separates it from New York city, with which it is, however, connected by about a dozen lines of steam ferries, and the East river suspension bridge, the longest of its kind in the world, being close on 6,000 feet in length, completed in 1883, with accommodation for foot, vehicular, and tramway traffic. In the city itself are, for internal communication, two lines of elevated railways, and numerous lines of tramcars. The Atlantic dock, covering an area of 40 acres, the Brooklyn and Erie basins, covering areas respectively of 60 and 40 acres, are among the largest works of the kind in the United States. There is also a United States navy yard, of about 40 acres. Brooklyn has a water frontage of 10 miles, a circumference of 22 miles, and an area of 25 square miles, and is the centre of an extensive trade as well as the seat of large and diverse industries. It is also one of the first cities of the United States, being provided with straight and commanding streets—in many cases lined with trees. Among its amenities particularly worthy of note are the Greenwood cemetery, comprising an area of 400 acres, and adorned with numerous fine monuments, and Prospect Park, of 570 acres, and laid out at a cost of about 12,000,000 dollars. It is often called the "city of churches," having close on 300 churches of different denominations, and is well provided with educational and charitable institutions. The first settlement of Brooklyn, or Brenkelen, as it was called originally by its Dutch founders, took place in 1636, and in 1834 it was incorporated as a city. Its site is associated with notable events of the revolution.

Brooks, CHARLES WILLIAM SHIRLEY, journalist, was born in 1815 in London, and began the study of the law. Captured, however, by literature, he became known as a writer of burlesque. He also wrote the Parliamentary summary for the *Morning Chronicle,* and in 1856 was sent to investigate the condition of the labouring classes in Russia, Syria, and Egypt, the results appearing in a volume entitled *The Russians of the South.* In 1851 he had become connected with *Punch,* for which he wrote the *Essence of Parliament,* and on Mark Lemon's death in 1870 he became its editor. He also wrote several works, chief of which are *Aspen Court, The Gordian Knot, The Silver Cord,* and *Sooner or Later.* He died in 1874 in London.

Broom, *Sarothamnus scoparius,* a common shrub of Western Europe, forming the type of a small genus of *Leguminosæ,* separated from *Cytisus* (q.v.) by the very long curved style and minute stigma. The stems of the shrub grown in Algeria are imported for walking-sticks under the trade name of Black Orange. The twigs are made into baskets in Madeira; are used as winter food for sheep; and, as an infusion, are employed medicinally, as are also the seeds, in dropsy, being diuretic and laxative, or, in larger doses, emetic and purgative. The broom is the badge of the clan Forbes, and its golden-yellow blossoms have often been celebrated by poets.

Broom-rape, the English name of the genus *Orobanche,* the type of the order *Orobanchaceæ,* parasitic plants closely related to the *Scrophulariaceæ,* from which, indeed, they differ mainly in their parasitic habit and in their one-chambered ovary. The Orobanches contain little or no chlorophyl, having fleshy brownish stems, leaves reduced to brown scales, and a spike of flowers with brown calyces, two-lipped pinkish or purple corollas, didynamous stamens, and numerous minute seeds. There are about seventy described species, natives of temperate and tropical climates, especially Eastern Asia and South Europe. There are six or eight British species, the roots of which, in germinating, attach themselves to those of various plants, especially clover, furze, broom, flax, thyme, and milfoil. The plants apparently vary considerably according to the species of their host-plant. Broom-rape is seriously injurious to clover crops.

Broom-tops (*Scoparii cacumina,* Brit. Pharmacop.). The flowering tops of the broom have a diuretic action, which renders them of much service in certain cases of dropsy. There are two officinal preparations: the decoction Decoctum Scoparii,

dose 1 to 2 fl. oz., and the Succus Scoparii, dose 1 to 2 fl. dr.

Brose, a Scottish name for a kind of porridge or stirabout.

Brosses, CHARLES DE, historian, and first president of the Parliament of Burgundy, was born in 1709 at Dijon. Among his numerous works were *Lettres sur Herculaneum*, the first writings upon that interesting subject. He was the first also to introduce the names of Australia and Polynesia, and in a dissertation *Sur le Culte des Dieux Fétiches*, used the word fetish with the significance it now commonly bears. Though a busy writer, he never neglected his official duties, and died in 1777, while occupying the presidency.

Broth, the liquor in which some kind of meat or vegetable has been boiled. Frequently both meat and vegetables are employed. [BEEF-TEA.]

Brotherhood, in the Christian churches, a voluntary religious association for various purposes. In the widest sense the term includes the monastic orders [DOMINICAN, FRANCISCAN, etc.], the earliest of which probably were founded in the 4th century, and also guilds (q.v.). But it is applied more especially to associations less strictly bound by rule than monastic communities, but having some religious or charitable object. The "Confraternity of the Sacred Heart" is a familiar modern Roman Catholic instance. In Southern France in the Middle Ages there was a brotherhood whose object it was to build bridges and maintain ferries. The "Cowley Brotherhood" is a modern Anglican example, and the "Rauhes Haus" at Hamburg is a German Protestant brotherhood.

Brothers, RICHARD, was born in 1757, at Placentia, in Newfoundland. After serving in the British navy, he retired in 1789 on a lieutenant's half-pay, which, however, he forfeited through his inability, on conscientious grounds, to take the oath. Styling himself "the nephew of the Almighty and Prince of the Hebrews appointed to take them to the Land of Canaan," he came forth in 1793 as the apostle of a new religion. In the following year he published *A Revealed Knowledge of the Prophecies and Times*, and for prophesying the death of the king was sent to Newgate in 1795. From here he was removed to Bedlam, being released in 1806. Believers in Brothers's theory, that the English are the lost tribes of Israel, are not yet extinct, and in his own times his followers included Nathaniel Halker, M.P. and orientalist, and many others. He died in 1824.

Brougham, a four-wheeled close carriage with two seats inside, each for two persons, with a raised seat for the driver outside.

Brougham, HENRY PETER, BARON BROUGHAM AND VAUX, was born in 1778 in Edinburgh, where at the High school and university he was educated. Called to the Scottish bar in 1800, his fame as a lawyer extended to England, and in 1808 he began to practise in London. In the following year he was returned to Parliament by Camelford, a borough in Cornwall, and soon became one of the leading speakers on the side of the Whigs. Defeated by Canning at Liverpool in 1811, the year in which he successfully defended Leigh Hunt, who was prosecuted for the republication of an article on flogging in the army, he did not occupy a seat in Parliament until 1816, when he was returned for Winchelsea. He then advocated educational and social reforms with great vigour, joined, in 1822, Birkbeck in the mechanics' institute movement, in 1826 associated with Knight in founding the Society for the Diffusion of Useful Knowledge, and took a prominent part in starting the London University. Meanwhile, in 1820, he had made his most famous and fearless appearance as an advocate in the defence of Queen Caroline, and this heightened his popularity to the highest pitch. In 1830 he denounced slavery in a powerful speech, and at the general election of that year was returned for the important constituency of the county of York. In the Reform ministry of Earl Grey he became Lord Chancellor and a peer, and in the House of Lords advocated with his usual force the necessity for reform. Thenceforth his influence waned, and when the Whigs went out, in 1834, Brougham's official life came to an end. He did much for law reform, and in a six hours' speech delivered in 1827 enumerated the defects in the different departments of English law. He was also a powerful orator, being considered as a debater inferior only to Canning. He was a voluminous writer—wrote much for the *Edinburgh Review*, which he took the chief part in founding, for newspapers, encyclopædias, and several independent works. He also wrote an autobiography, which was published posthumously. He latterly resided at Cannes, where in 1835 he had built a château, and where in 1868 he died. He was succeeded in the title by his brother William.

Broughton, RHODA, novelist, was born in 1837. Among her chief works are *Not Wisely but Too Well*, her first; *Cometh up as a Flower; Red as a Rose is She*, *The Game and the Candle*, etc.

Broughty-Ferry, a town of Scotland in Forfarshire, is situated on the Firth of Tay, and previous to the erection of the Tay Bridge was the route for travellers between Dundee and Edinburgh. It is a watering-place, and a favourite place of residence for Dundee merchants. It has an old castle, built in 1498, and now one of the defences of the Tay.

Broussa, BRUSSA, or BRUSA, a city of Asiatic Turkey, in the province of Anatolia, is situated at the foot of Mount Olympus and about a dozen miles S. of the Sea of Marmora. It has about 200 mosques —some accounts place the number at 600—and a 13th century citadel of Greek construction. Its industries embrace silk, wine, carpets, gauze, etc. Fruit also is largely exported. In the neighbourhood are the celebrated baths of Broussa, which, fed by mineral springs, reach a temperature sometimes of 180°. Meerschaum is also found. Broussa was anciently Prusa, the capital of Bithynia, and the residence of the Turkish sultans from 1329 until 1365, when the seat of empire was removed to Adrianople.

Broussais, FRANÇOIS JOSEPH VICTOR, was born in 1772 at St. Malo. After studying medicine

and graduating in 1803 M.D. at Paris, he became in 1820 a professor at the military hospital, Val-de-grace, and in 1831 of general pathology in the academy of medicine, Paris. He promulgated a theory of medicine strongly resembling the Brunonian system of John Brown (q.v.), and his followers assumed the name of the "physiological school." According to his theory, the fundamental fact in life is excitation or irritation, and disease is the result of over- or under- excitation. His chief work is the *Examen de la Doctrine Medicale Généralement Adoptée*, published in 1816. He died in 1838 at Vitry.

Brouwer, or BRAUWER, ADRIAN, painter, was born in 1608, at Haarlem. At Antwerp he came under the influence of Rubens and developed an admirable eye for colour. He was of dissipated habits, and as a result his favourite subjects are uproarious scenes from tavern life, which he depicted with great spirit, and which are the best of their kind. He died in a hospital at Antwerp, smitten by the plague, at the early age of thirty-two.

Brown Bear (*Ursus arctos*), a native of many parts of Europe, the north of Asia, Japan, and arctic America. It is about 6 feet long, stands 3 feet or rather more at the shoulder, and is clothed in longish dark-brown woolly fur; in habit it is solitary, in diet vegetarian or insectivorous, and rarely ventures to attack man unless first provoked. This species was formerly the victim of the miscalled "sport" of bear-baiting; and is often trained by Savoyards to walk erect and perform a clumsy sort of dance. The Brown Bear was at one time a native of Britain. [CAVE-BEAR.]

Brown, CHARLES BROCKDEN, novelist, was born in 1771, in Philadelphia. He abandoned law and devoted himself to literature, which he was the first American to adopt as a profession, his first novel, *Wieland*, appearing in 1798. In a later novel, *Arthur Mervyn*, he depicted with great force the ravages of the yellow fever in the year 1793, in Philadelphia. In addition to writing novels, he started and edited several American periodicals. He died in 1810 of consumption.

Brown, FORD MADOX, painter, grandson of Dr. John Brown (q.v.), was born in 1821, at Calais. He studied at Antwerp under Baron Wappers. In 1844 he sent two cartoons to the Westminster Hall exhibition, preliminary to the mural decorations of the Houses of Parliament, and in the following year he again contributed; but though his works won the encomiums of Haydon, they yet gained no prize. His *Chaucer reciting his Poetry at the Court of Edward III.* was exhibited at the Royal Academy in 1851, won the Liverpool prize of £50, and was shown at the Paris Exhibition of 1855. After other similar successes he held an exhibition in 1865 of his works in London. In his later life he was engaged in Manchester, decorating the town hall with a series of designs illustrative of the history of the city. Among his most characteristic works are *Cordelia and Lear*, *Christ washing Peter's Feet*, *Work*, *The Last of England*, *Romeo and Juliet*, *The Entombment*, and *Cromwell*. He is ranked generally among the pre-Raphaelites, and regarded as the master of Dante Gabriel Rossetti. He died in 1893. His son, OLIVER MADOX BROWN, a painter, poet, and novelist of extraordinary promise, died in 1874, at the age of 19. *Gabriel Denver* and *The Divale Bluth* are his best known works of fiction.

Brown, SIR GEORGE, general, was born at Linkwood, near Elgin, in 1790. He served in the Peninsular war, in the American campaign of 1814, and in the Crimean war, where he was severely wounded at the battle of Inkermann. For his services he was created a G.C.B. in 1855, and in the following year gazetted "General for distinguished service in the field." He died in 1865.

Brown, GEORGE LORING, artist, was born in 1814 in Boston, Massachusetts. He spent a long period in Europe studying, and gained a reputation as a landscape painter. He died in 1889. One of his works, *The Crown of New England*, was purchased by the Prince of Wales (afterwards Edward VII.).

Brown, HENRY KIRKE, sculptor, was born in 1814 at Leyden, Massachusetts. After a period of study in Italy he returned to America, where, at Brooklyn, he executed the first bronze statue cast in America. He died in 1886.

Brown, JOHN, was born near Abernethy, Perthshire, in 1722. His parents were very poor, and after a meagre education he was set to herd sheep. While tending his flocks he studied Greek, Latin, and Hebrew, qualified himself to occupy the position of a schoolmaster, and ultimately was licensed to preach in 1750. He wrote numerous works, the chief being, *The self-interpreting Bible*, *Dictionary of the Bible*, *Harmony of Scripture Prophecies*, and some church histories. He died in 1787 at Haddington, where he was the minister of the Burgher dissenting congregation.

Brown, JOHN, D.D., grandson of the preceding, was born in 1784 at Whitburn, Linlithgowshire. After studying at the University of Edinburgh he became a schoolmaster, studying theology in the summer vacation. In 1806 he was ordained pastor of the Burgher congregation at Biggar, receiving a charge in Edinburgh in 1822. In 1834 he became professor of theology in the college of his denomination. He wrote numerous religious works which attained a wide popularity, and on account of his utterances in the Atonement controversy of 1840–45 a formal charge of heresy was preferred against him. He died in 1858.

Brown, JOHN, doctor and essayist, son of the preceding, was born in 1810 at Biggar. Educated in the Edinburgh High school and University, he graduated M.D. in 1833, and began to practise as a physician, devoting his leisure to literature. His writings, which comprise papers on art, medicine, poetry, and humorous and pathetic sketches, are collected into the two volumes of *Horæ Subsecivæ* (leisure hours), and *John Leech and other Papers*. His most characteristic pieces are *Rab and his Friends* and *Pet Marjorie*. He died suddenly in 1882 in Edinburgh.

Brown, JOHN, founder of the Brunonian theory of medicine, was born in 1735, in the parish of Bunkle, Berwickshire. Educated at the Dunse grammar school, he removed thence to Edinburgh, where he supported himself by private teaching and attended lectures at the University. In course of time he attracted the notice of Dr. Cullen, who employed him as a kind of assistant, and entrusted him with the tuition of his children. Considering himself not fairly treated by Cullen in regard to his claims to a vacant professorship, Brown broke off the friendship and began to lecture on his own account, advancing the system of medicine that is now associated with his name, and according to which all diseases are of two kinds, the sthenic and the asthenic, or those caused by an excess and those caused by a deficiency of excitement—the former to be treated by debilitating, and the latter by stimulating medicines. In 1780 he published an exposition of his system in *Elementa Medicinæ*, a treatise that was widely read on the Continent. Though he attracted a good many followers, he also roused a great deal of opposition. He also became pecuniarily embarrassed, and was lodged in prison for debt. In 1786 he removed to London, and just as his prospects began to brighten, he died in 1788. He also published in 1787, *Observations on the Present System of Spasm as taught in the University of Edinburgh*, a scathing criticism of Cullen's errors, and the year before he left Edinburgh, *A short Account of the Old Method of Cure, and Outline of the New Doctrine.*

Brown, JOHN, abolitionist, was born in 1800 in Torrington, Connecticut. After several not very successful years in business as a tanner and a wool-dealer, he removed, in 1855, to Kansas, where with his four sons he headed the anti-slavery cause. In 1856 his house at Ossawatomie was burned and one of his sons slain. In 1859 he conceived the idea of liberating the slaves by a general uprising, and in pursuance of this seized the United States armoury at Harper's Ferry. The negroes, however, were not responsive, Brown was taken prisoner, and on December 2nd of the same year was hanged at Charlestown, Virginia. His fate gave an immense impulse to the anti-slavery movement, which culminated during the war of Secession which broke out the next year.

Brown, ROBERT, one of the greatest British botanists, was born at Montrose in 1773, and educated at Montrose grammar school, Marischal College, Aberdeen, and the University of Edinburgh. At Edinburgh his first paper, on the plants of Forfarshire, was read before the Natural History Society in 1792, and he became a correspondent of Withering. In 1795 he went to the north of Ireland as ensign and assistant-surgeon in the Forfarshire Fencibles, in which Dugald Carmichael was captain, and by him Brown was introduced to Sir Joseph Banks. In 1798 he was made associate of the Linnean Society, and in 1801 started as naturalist with Flinders's expedition to Australia, with Ferdinand Bauer as artist, and the future Sir John Franklin as one of the midshipmen. In 1805 he returned with 4,000 species of plants from New Holland, which he partly described in his *Prodromus Floræ Novæ Hollandiæ*, 1810-30, the first important work introducing the Jussieuian or Natural system of classification to English botanists. This work Brown recalled, its Latinity having been criticised. Brown became librarian to the Linnean Society and to Sir Joseph Banks, who at his death, in 1820, bequeathed him his house in Gerard Street, Soho, and his library and collections for his life. These were transferred to the British Museum in 1827, Brown becoming the first keeper of the botanical department. In 1811 he was made F.R.S.; in 1832, D.C.L. of Oxford; in 1833, associate of the Institute of France; and from 1849 to 1853 president of the Linnean Society, of which he had been a fellow since 1822. In 1839 he received the Copley medal of the Royal Society, and he also received the Prussian order "pour le merite." He died in 1858, and was buried at Kensal Green. There is an oil portrait of him by Pickersgill at the Linnean Society, and he was commemorated by Smith in the genus *Brunonia*. Humboldt styled him "botanicorum facile princeps." A collected edition of Brown's miscellaneous botanical works was published in 1866.

Brown, SAMUEL, chemist, grandson of the author of the *Self-interpreting Bible*, was born in 1817 at Haddington. Educated at the Edinburgh High school and University, he graduated M.D. in 1839. He devoted his attention chiefly to chemistry, and became possessed of the idea that elements usually considered simple and primary might be resolved into one another. He also contributed to general literature, publishing in 1850 the tragedy of *Galileo*. His *Lectures on the Atomic Theory, and Essays Scientific and Literary* were published in 1858. He died in 1856 in Edinburgh.

Brown, THOMAS, metaphysician, was born in 1778 at Kirkmabreck, Kirkcudbright. After a few years' study at the University of Edinburgh he began the practice of medicine in 1806, and in 1810 Dugald Stewart, professor of moral philosophy in the University, falling ill, he was chosen Stewart's colleague and successor. Meanwhile he had distinguished himself by his acute criticism on Dr. Darwin's *Zoonomia* and his essay on *Cause and Effect*, the views in which were suggested by Hume. He also published some indifferent poems, but his leading work is his *Lectures*, which were brought out in book form after his death. His main addition to psychological science was his elevation of muscular sensation into the rank of the senses, a point that has been subsequently developed by Professor Bain. He died in London in 1820.

Brown, THOMAS, miscellaneous writer, was born in 1663 at Shifnal, Salop. He left Christchurch, Oxford, somewhat suddenly, through his irregularities, and perhaps also on account of his clever application of Martial's epigram, "Non amo te, Sabidi," etc., to the Dean of Christchurch, Dr. Fell. Brown rendered it thus:—

> "I do not love thee, Dr. Fell,
> The reason why I cannot tell;
> But this I know, and know full well,
> I do not love thee, Dr. Fell."

He came to London, where he made a precarious livelihood by writing poems of a satirical nature, pamphlets, letters, etc., witty, it is true, but coarse and scurrilous. He led a licentious life, which terminated in 1704, and he was interred in the cloisters of Westminster Abbey, near his friend, Mrs. Aphra Behn.

Brown, SIR WILLIAM, was born in 1784 at Ballymena, co. Antrim. After a few years spent in the United States, he returned to Liverpool, and entered upon a singularly successful mercantile career as a general merchant. He took a keen interest in local affairs, among his most munificent gifts being the founding of the Liverpool public library, at a cost to himself of £40,000. From 1846 to 1859 he represented South Lancashire in Parliament, and in 1863 was created a baronet. He was a strong advocate of a decimal coinage. He died in 1864 at Liverpool.

Brown Coal. [LIGNITE.]

Brown Powder is a special variety of gunpowder largely used for modern heavy ordnance. Its ordinary composition is: Saltpetre 79, sulphur 3, and charcoal 18 parts, the charcoal being made from straw and carbonised by a secret process. The finished powder is made up into hexagonal prisms with an axial perforation. It gives high velocity combined with moderate pressure; it does not readily ignite, and when unconfined it burns without explosion. Another name for it is Cocoa Powder.

Browne, HABLOT KNIGHT, artist, was born in 1815 at Kennington, London. After an apprenticeship to an engraver, he in 1833 gained the Society of Arts' medal for an etching of *John Gilpin's Race*, and in 1836 succeeded Seymour as illustrator of *Pickwick Papers*, and under the pseudonym of "Phiz." Besides being associated with Dickens throughout many of the latter's novels, Browne also did illustrations for Lever, Ainsworth, Fielding, and Smollett. His work places him in the first rank of nineteenth century caricaturists, and although while his strength endured he was unceasingly active, he was saved only from starvation at the end by an annuity from the Royal Academy. Struck with paralysis in 1867, he died at West Brighton in 1882.

Browne, ROBERT, "the first seceder from the Church of England," and founder of the Brownists, was born about the middle of the sixteenth century at Tolethorpe, Rutlandshire. Graduating at Cambridge in 1572, he became a schoolmaster in London and used to preach on Sundays in the open air at Islington. After a further stay at Cambridge he was ordained, and thereafter proceeded openly to preach "against the calling and authorising of preachers by bishops." He established a body of worshippers on congregational lines at Norwich, and in 1581, having to seek refuge in Holland, he gathered some followers there. He subsequently returned to England, and becoming reconciled to the Established Church, was appointed rector of Achurch, Northamptonshire in 1591. Notwithstanding this, the Brownists themselves continued staunch, and in process of time became known as Congregationalists or Independents. Browne himself was imprisoned for assaulting a constable, and died in Northampton gaol about 1633.

Browne, SIR THOMAS, writer and physician, was born in 1605 in London. Educated at Oxford, he studied medicine, graduating M.D. at Leyden in 1633, and setting up in practice at Norwich in 1637. It is, however, not so much as a doctor as the author of the *Religio Medici* or *A Physician's Religion* that Browne is best known. It is supposed to have been written in 1635, and the manuscript being passed about among his private friends, it was surreptitiously published in 1642. This compelled the author to publish an authorised edition, which was done in 1643. The book at once attracted the attention of the learned throughout Europe, being translated into various languages, and honoured with insertion in the *Index Expurgatorius*. Browne's next book, *Pseudodoxia Epidemica, or Inquiries into very many received Tenets and commonly presumed Truths, which examined prove but Vulgar and Common Errors*, appeared in 1646, and heightened the author's literary reputation as well as displayed his learning. In 1658 his *Hydriotaphia, Urn Burial; or a Discourse of the Sepulchral Urns lately found in Norfolk*, and *The Garden of Cyprus, or the Quincuncial Lozenge, net-work Plantations of the Ancients, artificially, naturally, mystically considered*, appeared—the former being a treatise on the burial customs in different countries and different times, the latter being a fantastic attempt to show that the number five pervaded the horticulture of the ancients, and recurred throughout plant-life. These works ranked him amongst the first antiquaries, and in 1665 he was appointed an honorary member of the College of Physicians. When Charles II. visited Norwich in 1671 he conferred a knighthood on Browne. Other writings of his were published after his death, which occurred in 1682. He was buried in St. Peter's, Mancroft, Norwich, and his coffin was accidentally split open by some workmen in 1840. The bones were found to be in good preservation, even the auburn hair being still fresh. His skull is now preserved under a glass case in the museum of Norwich hospital.

Browne, ULYSSES MAXIMILIAN, COUNT, was born in 1705 at Basel. Entering the Austrian army, he became a field marshal and commanded the Austrians at Lobositz (1756) in the Seven Years' war. He received his death wound at the battle of Prague, and expired in 1757.

Browne, WILLIAM, poet, was born in 1591 at Tavistock. While still only twenty-two he published book i. of *Britannia's Pastorals*, which was well received, and still holds a distinguished place in English poetry. His next leading production was *The Shepherd's Pipe*, which appeared in 1614. Regarding Browne's life little is known. In 1624 he became tutor to Robert Dormer, Earl of Carnarvon, and subsequently entered the family of the Herberts at Wilton, where he "got wealth and purchased an estate." He died about 1640 at Dorking.

Brownian Movements, the vibratory motions of small solid particles in liquid. They may be studied with a microscope by means of particles of gamboge suspended in water, which will be found to have this continual vibratory motion. The exact cause is unknown, but the degree of the effect depends on the surface tension of the liquid used.

Brownie, a domestic goblin, common in European folk-lore, supposed to do house and farm work at night in return for a bowl of cream, and on the condition that he was not watched. The gist of the legends concerning the Brownie will be found in Milton (*L'Allegro*, 105–114), and belief in him lingered till very recently—if, indeed, it is yet extinct—in the North of England, where he was known as "Hob." Dr. Atkinson (*Forty Years in a Moorland Parish*, 1891) tells of a farm in Cleveland where "Hob," so long as he was not spied upon, did much excellent work at night.

Browning, ELIZABETH BARRETT (born 1806, died 29th June, 1861), more properly Elizabeth Barrett Moulton-Barrett Browning, was born in London, a daughter of Mr. Moulton, a wealthy Jamaica planter, who added the name of Barrett to his own. She began to write poetry at ten, and in 1827 published anonymously her first volume of verses, an *Essay on Mind*, with a number of smaller poems. In 1833 she sent to press a translation of Æschylus' *Prometheus Bound* and a collection of *Miscellaneous Poems*. She was already a student of Greek philosophy, as well as of Greek poetry; she also acquired a mastery of Hebrew, as well as of Italian and other modern languages, and all this notwithstanding her state of chronic ill-health. Though a delicate infant, she had grown to be a fairly-strong and high-spirited girl, when, at about the age of fourteen, she met with injury to her spine, which permanently undermined her health. In 1837 a blood-vessel broke upon her lungs and endangered her life. This, however, did not prevent her from publishing *The Seraphim and other Poems* in the following year. In the summer of 1839 her health received another shock: her favourite brother and two friends were drowned before her eyes at Torquay. It was not till 1840 that she could be taken back to London—to Gloucester Place, where, in a darkened room, she lived in seclusion for six years, enduring much pain, but always writing or reading. In 1844 she published her touching *Cry of the Children*. In the following year she became acquainted with Robert Browning, and was married to him at St. Pancras church, on September 12th, 1846, in strict privacy. Her father never forgave her disregard of his authority; but in every other respect the marriage abundantly justified itself. Her health gradually improved, and for some years she lived at a higher physical level. To this period belongs her best work. In 1850 appeared her *Sonnets from the Portuguese*, written some time before, in which she sings out her love under the thin disguise of a fictitious title. This was followed, in 1851, by *Casa Guidi*, and this in 1856 by her longest poem, *Aurora Leigh*, "a novel in verse." In 1860, the year before her death, came her *Poems before Congress;* her *Last Poems* were published by her sorrowing husband in 1862. The defects in Mrs. Browning's work are occasional roughness of versification and forcing of phrase, lack of variety, want of humour, and—more serious still—absence of reserve. Its merits, however—its splendid pourtrayal of a romantic passion, strong yet pure, its wealth and magnificence of metaphor, its social enthusiasm, its spirit of freedom, its spiritual significance—are such as to give her indisputable right to the foremost place among poetesses.

Browning, ROBERT (born 7th May, 1812, died 12th December, 1889), was born at Camberwell, his father being a clerk in the Bank of England, while his mother was the daughter of William Wiedemann, a Hamburg-German shipowner, who had settled in Dundee and married a Scotswoman. His mother, while of saintly character, was not remarkable for mental gifts, and save his love of music, which he may have inherited from her, and a nervous impressibility which in him was heightened into the poetic temperament, the gifts of the poet, so far as they were hereditary, are to be traced rather to his father, who was a man of wide and curious reading and much general culture. Till nearly fourteen Robert went to a private school at Peckham, kept by the Rev. Thomas Ready; he then studied under a French tutor at home, and for a term or two attended a Greek class at University College, afterwards taking a continental tour. In his twelfth year he wrote a number of poems, which he and his friends sought, without success, to publish, under the title *Incondita*. At the age of eighteen he decided to take to poetry as a profession, and, as a preparatory measure, read through the whole of Johnson's *Dictionary!* His first poem, *Pauline*, appeared when he was twenty-one, in 1833. Though little noticed, it was favourably reviewed in the *Monthly Repository*, by W. J. Fox, who was the first to "discover" the new poet. In 1835, having in the interval spent some time in Russia, he published his *Paracelsus*, a dramatic poem of nearly 4,000 lines, which attracted little more attention than *Pauline*. In 1837 he wrote his first tragedy, *Strafford*, for Macready, who produced it at Covent Garden on the 1st of May; it went through five performances, which was for those days a respectable run. His next poem, *Sordello*, was kept back till 1840; it is quite the most obscure of his works, and probably injured the reputation he was by this time beginning to acquire. Between 1841 and 1846 he brought out his *Bells and Pomegranates*, containing three plays, four tragedies, and a number of *Dramatic Romances and Lyrics*, including some of his most popular pieces. *A Blot in the 'Scutcheon* was produced by Macready at Drury Lane on the 11th of February, 1843, but it was not a success, and was the occasion of lasting estrangement between Browning and his actor-friend. In 1846 occurred his marriage with Elizabeth Barrett (*see* above); thenceforward, for nearly fifteen years, Florence was his home, though he occasionally visited England. In 1850 two of his longest religious poems, *Christmas Eve* and *Easter Day*, saw the light; in 1852 he wrote

a prose introduction to some *Letters of Shelley*, afterwards shown to be spurious; and in 1855 appeared the poems by which, with some of the *Dramatic Romances and Lyrics*, he will probably be best known to posterity, his *Men and Women*. *Dramatis Personæ* followed in 1864. In 1868 his longest work, *The Ring and the Book*, in four vols. (21,116 lines), began to appear, being completed in 1869. In 1871 he produced *Hervé Riel*, *Balaustion's Adventure*, and *Prince Hohenstiel-Schwangau*; in 1872, *Fifine at the Fair*; in 1873, *Red Cotton Night-cap Country*; in 1875, *Aristophanes' Apology*, and *The Inn Album*; in 1876, *Pacchiarotto*, and other poems; in 1877, another translation, *The Agamemnon of Æschylus*; in 1878, *La Saisiaz*, with *The Two Poets of Croisic*; and in 1879, the first set of *Dramatic Idylls*, a second series appearing in 1880. In 1883 was published *Jocoseria*; in 1884, *Ferishtah's Fancies*; in 1887, *Parleyings*; and in 1889, *Asolando*. The poet's death took place at Venice, on the day *Asolando* appeared, but not before the news of its realised success had been communicated to him. As he could not be buried with his wife at Florence, he was brought home to England and interred in Westminster Abbey on the last day of the year. The time is not yet ripe, nor nearly ripe, for determining Browning's precise place among English poets. It was not till more than a generation after the appearance of *Pauline* that he was accepted in England as a great writer of verse; but for some years before his death he had come to be regarded as one of the two greatest Victorian poets. His works written for the stage, though vivid and sinewy, are often marred by over-subtlety, and are not likely to gain a foothold there. His genius probably touched its high-water mark in the *Men and Women*, for although *The Ring and the Book* abounds with passages and even whole sections of rare splendour and power, the scheme of the poem is metaphysical rather than poetic. His workmanship was undeniably defective, although on the other hand it must be said that to him poetry is indebted for a new sense of the capability of an important poetic form, the monologue; and that his command of rhymes, and particularly of grotesque rhymes, was quite exceptional. Whatever be the rank assigned him by posterity in the poetic hierarchy, it is difficult, when we think of the number and quality and variety of his gifts, and of his amazing fertility, not to feel that in endowment, as distinct from achievement, he was superior to any English poet since Milton.

Brownson, ORESTES AUGUSTUS, writer, was born in 1803, at Stockbridge, Vermont. He adopted at different times various shades of religious opinion, being successively a Presbyterian, Universalist, Unitarian, and Roman Catholic. Amongst his writings were *The Spirit-Rapper* and *The American Republic, its Constitution, Tendencies, and Destiny*. He died in 1876 at Detroit.

Bruat, ARMAND J., French naval officer, was born in 1796. As vice-admiral he commanded the French fleet in the Black Sea, in 1855, and co-operated with Rear-Admiral Sir Edmund Lyons in the operations against Kertch, Yenikale, Berdiansk, Anapa, etc., and against Sevastopol; and was present at the capture of Kinburn. He died towards the close of the same year.

Bruce, the name of a family descended from a Norman knight, Robert de Brus, who came over with the Conqueror, and who obtained extensive grants of lands in Northumberland. Later the family received additional grants in Annandale from David I., and so took rank among the territorial lords of Scotland. Among the more renowned of the Bruces were:—(1) ROBERT BRUCE, who was born in 1210, and was the rival of John Baliol for the Scottish crown on the death of Margaret, "the Maiden of Norway." He claimed as the grandson of David, Earl of Huntingdon, by the second daughter Isabel, while Baliol claimed as the great-grandson by the eldest daughter. Edward I. arbitrated in favour of Baliol in 1292, and to avoid swearing fealty to Baliol, Bruce, who died in 1295, resigned his Annandale estate to his eldest son. (2) ROBERT BRUCE, Earl of Carrick, eldest son of the preceding, accompanied Edward I. to Palestine in 1269, and fought on the side of the English in the battle of Dunbar, when he applied in vain to Edward for the Scottish crown. He married Marjory, Countess of Carrick, in 1271, and died in 1304, the eldest son being (3) ROBERT BRUCE, one of the most famous kings of Scotland. He was born in 1274. In 1296, as Earl of Carrick, he paid homage to Edward I., and in the following year assisted the English against Wallace. In 1298, however, he joined the national party, and in 1299 became one of the four regents of Scotland, of which John Comyn, nephew of Baliol, was the chief. For several years Bruce kept up an appearance of fidelity to Edward, and sometimes even resided at his Court, but the final severance came in 1306, when Bruce stabbed his rival Comyn. In the same year he was crowned king at Scone, and an English army was sent against him. Defeated twice, he disbanded his followers, and retired to Rathlin Island, on the N. coast of Ireland. Here he remained all winter, and he was supposed to have died, when suddenly in the spring of 1307 he landed on the Carrick coast and defeated the English at Loudon Hill. He soon cleared the English garrisons out of Scotland, excepting that stationed at Stirling Castle. It was to the relief of this garrison that the English forces were advancing under Edward II. in 1314, when Bruce encountered them at Bannockburn (q.v.) on June 24th. In 1317 he went to Ireland to the aid of his brother Edward, who was king of that country, and on his return made reprisals upon England for her inroads upon Scotland during his absence. At last, in 1328, by the treaty of Northampton, the independence of Scotland and Bruce's right to the throne were recognised. He himself fell a victim to leprosy, and in 1329 died at Cardross castle, on the Firth of Clyde. He was married—first to Isabella, a daughter of the Earl of Mar, by whom he had a daughter, Marjory, the mother of Robert II.; second to Elizabeth, daughter of Aymer de Burgh, Earl of Ulster, by whom he had a son, David II.

Bruce, EDWARD, King of Ireland, and brother of Robert I. of Scotland, was in 1315 offered the crown of Ireland by the Ulster chiefs on condition of his aiding them against the English. After his successes he was crowned in 1316 at Carrickfergus. Two years later, however, he was slain at Dundalk in battle.

Bruce, JAMES, traveller, was born in 1730, at Kinnaird, Stirlingshire. Educated at Harrow and Edinburgh University, he began business in London as a wine merchant. In 1763 he became consul-general at Algiers, and in 1768 set out for Cairo, navigated the Nile as far as Syene, crossed the desert to the Red Sea, and after spending some months in Arabia Felix arrived at the Abyssinian capital, Gondar, in 1770. In the same year he reached the sources of the Abawi, which he mistook for the source of the Nile. After quite a couple of years' enforced stay in Abyssinia, he returned to Cairo, and, visiting France and Italy, to Scotland in 1774. In 1790 his *Travels to Discover the Sources of the Nile in the years 1768–73* were published, and excited the incredulity of many on account of the curious accounts of the manners and customs of the Abyssinians. Though he received the personal notice of the king, he was hurt, on his return, that no honour was conferred on him, and it was only the instigation of friends and the need of occupying his mind that induced him to write his travels. He died at Kinnaird of a fall on the stairs in 1794.

Bruce, MICHAEL, poet, was born in 1746 at Kinneswood, in the parish of Portmoak, Kinross-shire. Though only a weaver's son and a herd boy, he yet in 1762 managed to go to Edinburgh University. In 1765, his ultimate aim being the ministry, he became schoolmaster, but died in two years. His poems, of which the chief was the *Elegy* on his own approaching death, were published in 1770 by the Rev. John Logan. Among the collection was an *Ode to the Cuckoo*, which Logan claimed as his own, and the real authorship of which, whether Bruce's or Logan's, is among the vexed questions of literary controversy.

Bruchsal, a town of the Grand Duchy of Baden, is situated on the Salzbach, and is 14 miles from Carlsruhe. From the eleventh to the beginning of the nineteenth century it was the seat of the Bishop of Spires. It has an old castle of the twelfth century, now a prison, and does a considerable trade in cigars and wine. There is also a fine palace belonging to the Grand Duke of Baden.

Brucine, an *alkaloid* of composition $C_{23}H_{26}N_2O_4$, found with several others in nux vomica and St. Ignatius' bean. It crystallises in prisms, soluble in water and alcohol, and is characterised by giving a fine red colour with nitric acid. It is closely allied in its action to strychnine (q.v.), but is more readily soluble than the latter.

Brückenau, a small town and watering-place of Bavaria, is situated on the Sinn, and is 16 miles north-west of Kissingen. The mineral springs are recommended mainly for nervous and cutaneous affections.

Brueys, FRANÇOIS PAUL, a very gallant French naval officer, was born in 1753. In 1797, as rear-admiral, he cruised in command of a squadron in the Mediterranean, and in the following year, as vice-admiral, in the *Orient*, 120, commanded the fleet which was practically destroyed by Lord Nelson at the battle of the Nile on August 1st. In that action he was twice severely wounded, and later was almost cut in two by a round shot. He declined to go below, saying: "A French admiral should die on his quarter-deck;" and in a quarter of an hour he breathed his last.

Bruges, one of the most flourishing commercial cities of Belgium, is situated in a fertile plain which is intersected by the canals of Ghent, Ostend, and Sluys. These connect the city with the sea, which is about eight miles away, and over them are upwards of fifty swing bridges to allow the passage of vessels. It is from the circumstance of having so many bridges that Bruges derives its name. It has also some remarkable buildings, noteworthy amongst which are the church of Notre Dame, with its lofty spire and tomb of Charles the Bold, the cathedral of St. Sauveur, containing the stalls of the Knights of the Golden Fleece, the Halles, in whose Gothic belfry are the finest chimes in the world, and the Hotel de Ville, with a library of 100,000 volumes. There are also interesting art works by Jan van Eyck, Memling, the Van Oosts, and Michael Angelo, to whom the sculpture of the *Virgin and Child* in the church of Notre Dame is attributed. Among its manufactures are lace, for which it is celebrated, linens, woollens, cottons, starch, distillery, sugar-refining, and shipbuilding; and its canal communications and position at the junction of several railways make it a great trading centre. It dates from the third century, and became a leading mart of the Hanseatic League, and the centre of the commercial world—a position that it lost through the blighting breath of religious persecution. It became incorporated with Belgium in 1830.

Brugg, a Swiss town in the canton of Aargau, is situated on the Aar. It is near the site of *Vindonissa*, the leading Roman station in Helvetia, and also the Abbey of Königsfelden, in whose vaults are interred many members of the House of Hapsburg.

Brugsch, HEINRICH KARL, Egyptologist, was born in 1827 at Berlin. He first went to Egypt in 1853, and engaged in Mariette's excavations at Memphis. After a journey to Persia in 1860 he was appointed to the chair of Oriental languages at Göttingen. In 1869 he again returned to Egypt, not coming back till 1883, when he had been created a bey and a pasha by the Egyptian government. Among his numerous works, which are of the first rank, the chief are *Geographische Inschriften altägyptischer Denkmäler*, *Geschichte Egyptens unter den Pharaonen*, *Dictionnaire Géographique de l'ancienne Egypte*, *Travels in Egypt*, *Demotic Grammar*, and *Demotic and Hieroglyphic Dictionary*. He died in 1894.

Brühl, HEINRICH, COUNT VON, statesman, was born in 1700 at Weissenfels. Having served as a

page to the Duchess of Saxe-Weissenfels, he rose by his tact to the position of prime minister of Augustus III., King of Poland, to gratify whose profligate wishes he recklessly squandered the resources of the state. Brühl also enriched himself and lived in greater magnificence than even the king himself. His library of 62,000 volumes is now one of the chief features of the royal library at Dresden. He died in 1763.

Bruix, EUSTACHE DE, a distinguished French naval officer, was born in 1759, and was a commodore in the first republican fleet that put to sea in 1793. He was a rear-admiral in Villaret's fleet in the action with Lord Bridport off the Isle of Groix in 1795, and next year commanded the fleet in Toulon. From April 28th, 1798, to March 14th, 1799, as vice-admiral, he was minister of marine, and was exceedingly active. In 1799 he commanded (with five rear-admirals under him) the fleet which left Brest on April 25th, and entered the Mediterranean. He was afterwards in command of the enormous flotilla which was destined for the invasion of England. He died in 1805.

Brumaire, the name adopted in 1793 by the first French republic for the second month of the republican year, extending from October 23rd to November 24th. The eighteenth Brumaire of the eighth year of the republic (November 9th, 1799) was the date of the establishment of Napoleon's power.

Brummell, GEORGE BRYAN, "Beau Brummell," was born in 1778 in London. Educated at Eton and Oxford, he became acquainted with the Prince of Wales, afterwards George IV., and was made by him a cornet in the 10th Hussars, the Prince's own regiment. Under such a patron and with the assistance of £30,000 left him on his father's death in 1794, he rapidly rose in society. At last he and the Prince quarrelled in 1813, and Brummell had to seek refuge from his creditors in Calais, where he was partly supported by remittances from his friends and partly by the remains of his patrimony. In 1830 he was appointed consul at Caen, but on the post being abolished he was reduced to destitution, and died in 1840, in the lunatic asylum of that city.

Brunai, a territory of N.W. Borneo, covers an area of 18,000 square miles. The name of the capital is Brunaï, or Brunei, and it stands on a river of the same name. The inhabitants are chiefly Mohammedans. [BORNEO.]

Brunanburh, the scene of a battle fought in 937, between Athelstan and the Danes, Scots, and Celts. Its locality is not known, though an account of the engagement is preserved in the Anglo-Saxon *Chronicle*.

Brunck, RICHARD FRANZ PHILIP, scholar, was born in 1729 at Strasburg. After some military service in the Seven Years' war, he resumed his studies and became an able critic and commentator of the classics. He published useful editions of Virgil, Apollonius Rhodius, Anacreon, Aristophanes, Sophocles, etc. His studies were interrupted by the Revolution, and during the Terror he was imprisoned. After his liberation he was so reduced that he was obliged to sell his library. He died in 1803 at Strasburg.

Brune, GUILLAUME MARIE ANNE, French marshal, was born in 1763 at Brives-la-Gaillarde. Entering the army in 1793, he saw service in the Vendean war, and in Italy under Massena. In 1799 became commander of the army in Holland, from the northern part of which he drove the British and Russian forces. So signal were his services that in 1804 he received a marshal's *bâton*, and in 1807 became governor-general of the Hanseatic towns. On Napoleon's return from Elba he was placed in command in the S. of France, which he was compelled to surrender after Waterloo. Setting out for Paris, he was attacked by a mob of royalists, who brutally murdered him on August 2, 1815, at Avignon.

Brunel, ISAMBARD KINGDOM, engineer, was born in 1806 at Portsmouth. At the age of twenty he assisted his father, Sir Marc Isambard Brunel, in the building of the Thames Tunnel; and as engineer to the Great Western Railway, to which he was appointed in 1833, he carried out his plans for the broad-gauge system, and had the construction of all the works on the line. Among his chief works were the *Great Western*, the first steamship employed in regular Atlantic service; the *Great Britain*, the first large vessel with a screw propeller; and the *Great Eastern*. He also built Hungerford bridge at Charing Cross, the Clifton suspension bridge, and some of our principal docks. He died in 1859.

Brunel, SIR MARC ISAMBARD, engineer, was born near Rouen in 1769. Early exhibiting an aptitude for mechanics, he in 1786 entered the French navy. During the time of the revolution he found it necessary to flee for safety to the United States, and there, in 1794, his engineering career began in connection with the canal leading from Lake Champlain to the Hudson at Albany. In 1799, coming to England, he was employed by the British Government in making block-pulleys for ships by machinery, according to plans of his own, instead of, as formerly, by hand. His machinery for this purpose—which was completed in 1806, and which on the first year's work saved about £24,000—is still used; and as a reward for his invention he received from Government £17,000. Besides being employed upon works of public utility, he also invented machines for making shoes without seams, wooden boxes, nails, and other minor ingenuities. His leading achievement, however, was the Thames Tunnel, an undertaking twice previously attempted. This was begun in 1825, and completed in 1843. Amongst honours that befel Brunel were his appointment as fellow of the Royal Society in 1814, and as vice-president in 1832, and a knighthood in 1841; he also belonged to various foreign societies. He died in 1849.

Brunelleschi, FILIPPO, architect, was born in 1377 at Florence. After being a goldsmith and a sculptor, he turned his sole attention to architecture, and visiting Rome with Donatello, he became

inspired with the traditions of the classical period, which he sought to revive in architecture. His great work was the dome of the cathedral of Santa Maria at Florence, founded in 1296, entrusted to him about 1407. The possibility of this dome—the largest diametrically in the world and the model followed by Michael Angelo in the construction of St. Peter's—was denied by other architects, but, excepting the lantern in the summit, Brunelleschi lived to see it completed. Among other of his works were the Pitti Palace at Florence, the churches of San Lorenzo and Spirito Santo, and the Capella dei Pazza. He died in 1446, and was buried in the church of Santa Maria.

Brunhilda, (1) in the epic poem, the *Nibelungenlied*, the Queen of Iceland, and instigator through jealousy of the murder of her former lover Sigurd. (2) Wife of Sigebert, King of Austrasia. She, as regent for her grandsons, Theodebert II., King of Austrasia, and Theodoric II., King of Burgundy, at the beginning of the 7th century, shared with Fredegond, the former mistress of the King of Neustria, and regent for the young Clotaire II., and Brunhilda's later rival, in the ruling of the whole Frankish world. In 613 she was overthrown by the Austrasian nobility and put to death.

Bruni, LEONARDO, scholar, was born in 1369 at Arezzo, and is generally named, in consequence, Leonardo Aretino. He became in 1405 papal secretary, serving as such under four popes, and from 1427 till his death in 1444 was secretary to the Florentine republic. Besides his *History of Florence* and translations of leading Greek authors, he wrote biographies of Petrarch and Dante, and various other works of an historical character.

Brünig, a pass in Switzerland, connects the Bernese Oberland and the Forest Cantons. A railway was opened through it in 1888.

Brünn, city of Austria, capital of Moravia, is situated at the junction of the Schwarzawa and the Zwittawa, by which rivers it is nearly surrounded. Besides a cathedral and other interesting ecclesiastical edifices, it has on the Spielberg, a hill behind the city, the castle in which Silvio Pellico was confined for about eight years. It is also one of the chief centres of the woollen industry in Austria, and is thereby known sometimes as the Moravian Leeds. Its Stadttheater, opened 1882, is the first theatre on the Continent that was lit by electricity. It was Napoleon's headquarters in 1805 before the battle of Austerlitz.

Brunne, ROBERT OF, a monk, belonged to the order of St. Gilbert of Sempringham, and flourished in the time of Edwards II. and III. His real name was Robert Mannyng, and his monastery was near the site of Bourn, Lincolnshire. He wrote amongst other things a book of moral anecdotes, entitled, *Handlynge Synne*, and is noted for his deliberate adoption of English instead of French, so that, as he said, the common people might "haf solace and gamen in felauschip when tha sit samen."

Brunnow, PHILIP, COUNT VON, diplomatist, was born in 1797 at Dresden. Entering the Russian service in 1818, he in 1839 was sent to London on special business, becoming the accredited Russian ambassador. Leaving London at the commencement of the war in 1854, he jointly with Count Orloff represented Russia in 1856 at the conference of Paris. At the London conferences of 1864 and 1871 he was again Russia's representative. He died in 1875 at Darmstadt.

Bruno, GIORDANO (born about 1548 at Nola), an Italian free-thinking eclectic philosopher of the Renaissance. Partly adopting principles culled here and there from ancient philosophies, and partly working out a theory of his own, he was a determined opponent of the scholastic philosophy of the day. Very early in life he entered the Dominican order, but his advanced views soon caused his expulsion from the order and his flight from Italy. He tried to find refuge in Geneva, but found no favour in the eyes of the Calvinists, and wandered on, finally reaching Paris in 1579, where he was offered a chair of philosophy upon conditions that he did not see fit to accept, although he certainly delivered lectures there upon logic. In 1583 he went to England under the protection of Michel de Castelnau, the French ambassador, where he remained for about two years, and made the acquaintance of Sir Philip Sidney and other worthies. He was naturally little pleased with what he considered the pedantic devotion to Aristotle which prevailed at Oxford, and he held a disputation there as to the comparative merits of the Aristotelian and Copernican systems of the universe. In 1586 he returned with De Castelnau to Paris, but very soon wandered, or was driven, on to Marburg, Wittenberg, Prague, and Zurich, from which place he accepted an invitation to Venice. Here he fell into the hands of the Inquisition, and was brought to Rome in 1593. After seven years of imprisonment he was excommunicated, and is said, but the point is doubtful, to have been burnt at the stake in 1600. His system of logic, though it professed to be based upon rationalistic principles, shows traces of the Platonic theory of ideas, and is tinged with the colours derived from other systems. He was the forerunner of what has been called Spinozism, and his fundamental idea was to find the unity that lies at the bottom of all phenomena. Like most others who have thought and written upon philosophy, his ideas changed and developed. He appears to have changed from a kind of pantheism, in which matter and the informing intelligence are hardly distinguishable, to a theory by which the phenomena of matter are the manifestation and realisation of a Divine intelligence. Among his chief works were *Ash-Wednesday Table Talk*, an exposition of the Copernican theory; *Expulsion of the Triumphant Beast; On the One Sole Cause of Things; On the Infinity of the Universe and of Worlds*; etc.

Bruno, SAINT (1040–1101), the founder of the Carthusian Order. He was born and educated at Cologne, and at Rheims was appointed rector of studies in the schools of the diocese. In 1084 he retired with six companions to a mountain solitude near Grenoble, where he and they entered upon a life of great strictness, living in cells apart, and only meeting upon Sunday. The rule they adopted

was that of St. Benedict. In 1089 he was summoned to Rome by Pope Urban II., who had been his pupil, and preferment was offered him, but he declined all honours, and withdrew to Calabria, in whose solitudes he founded the monastery of "the tower" (Della Torre), where he died. His canonisation was in 1514.

Bruno the Great (925–968) was the third son of the Emperor Henry the Fowler. In the reign of his brother Otho I. he became chancellor of the empire and Archbishop of Cologne, as well as Duke of Lorraine, and he was greatly devoted to the advancement of learning and the reformation of the monasteries.

Brunswick, a duchy lying between Prussia, Hesse, Hanover, and Saxony, and divided into six administrative circles. The southern part of the state is mountainous, but much of the rest of it is level, and belongs to the basin of the Weser, with its tributaries the Aller, the Fuse, the Leine, and the Ocker. The Harz has a severe climate, and the harvests are a month behind the usual time, but in the other parts the temperature is milder, and the harvest, cattle-breeding, and the work necessary in the forests are the mainstay of the people. The Harz mountains produce gold, silver, lead, copper, iron, zinc, alum, vitriol, and salt, and Hülmstädt and Scesen are noted for their mineral springs. The chief industries are spinning, weaving of flax, and brewing; and next come cloths, woollens, chemical products, and glass-work. The capital, Brunswick, is the chief seat of trade, and good roads, a railway line, and navigable rivers contribute to its convenience for commerce.

The government of Brunswick is a hereditary monarchy, and there is a legislative assembly of representatives, and the duchy has two votes in the federal assembly. The railways and a large proportion of the mines and forests belong to the state. Most of the people are of Saxon origin, and the natural dialect of the state is Low German.

The House of Brunswick was founded by Henry the Lion, and his grandson Otho, in 1235, was the first to hold the dukedom of Brunswick as a fief of the Empire. During the general upset of Europe consequent upon Napoleon's actions the duchy of Brunswick formed part of the kingdom of Westphalia till after the battle of Leipsic, when the duchy was restored to Frederick William, son of Duke Charles William, who was killed at Auerstadt, and for whom his troops adopted the mourning uniform which gave them the name of "Black Brunswickers." On the death of Frederick William at Quatre Bras his possessions passed to his son Charles Frederick, who abdicated in 1831, and, after a life notorious for its many eccentricities, died childless in Geneva in 1873. At present the ducal seat is in abeyance, since, after the death, in 1884, of the last Duke William the succession passed to the Duke of Cumberland, son of the dethroned king of Hanover, who refuses to recognise the new German constitution. Duke John Albrecht of Mecklenburg was elected regent in 1907.

Brunswick, capital of the above-mentioned duchy, is on the Ocker, 143 miles from Berlin, and 37 miles S.E. of Hanover. It is an old city, once a Hanseatic town and of much importance while the Hanseatic league prospered. It is irregularly built, and was contained by fortifications which, as at Brussels, Antwerp, and elsewhere, have now become boulevards and promenades. It contains a university, an institute of forests and of agriculture, and has an increasing trade in cloth, linen, gloves, mirrors, lacquer ware, tinplate, straw hats, tobacco, and beer, especially the beer called Mumme, which is a speciality of Brunswick. Of its public buildings the cathedral of St. Blaise, begun by Henry the Lion in 1176 and finished in 1469, is notable. In it is the tomb of Henry the Lion and his wife Matilda, daughter of Richard Cœur de Lion. Some interesting wall paintings were discovered about forty years ago, buried beneath a coat of whitewash. The original ducal palace is now barracks, but there is a modern palace. The Rathhaus is an old Gothic building and has some interesting statues from Henry the Fowler downwards, and the Cloth Hall is a good specimen of mediæval architecture. There are several other noteworthy churches in the town, among them St. Magnus's (1031) and St. Andrew's, with a spire of 318 feet.

Brush, an instrument of varying sizes and shapes used for various purposes. When employed for the removal of dirt or dust, stiff hairs or fibres are generally used, hogs' bristles, wires, vegetable fibres, strips of whalebone, etc., being the principal materials for manufacture. For soft-haired brushes, such as are used by painters, the hairs of the camel, squirrel, badger, goat, polecat, etc., are required.

Brush Discharge, in *Electricity*, means the discharge of the electricity from a charged body into the surrounding air or other gas, by a process of convection. It will take place most vigorously at the points or corners of the body, for at such places on the surface of a conductor the density of the electrical charge is greatest. Particles of air near some such point are electrified by induction and drawn into contact with the conductor, thereby receiving part of the charge. Possessing this, they are repelled on account of the tendency for two quantities of electricity of the same kind to increase their distance apart. Thus the charge in the body is carried off by the air, currents of which may be readily observed to proceed from the sharp corners and points during discharge. The brush discharge is faintly luminous, very small sparks occurring at the contact of the air particles with the conductor. [ELECTRICITY, INDUCTION, ST. ELMO'S FIRE.]

Brush System. [ELECTRIC LIGHTING.]

Brush Turkey, any individual or species of Talegallus, a genus of Megapodes (q.v.), with one species from East Australia and another from New Guinea. The popular name was conferred by the settlers on the first species from the sombre plumage and the wattles on the head and neck. These birds may be generally seen in the Zoological Gardens, Regent's Park.

Brussels, the capital of the kingdom of Belgium, and the chief town of South Brabant, is about 50 miles from the sea, 27 from Antwerp, and 193 from Paris. It is on the top and sides of a hill sloping down towards the little river Senne, which is now arched over; and besides being the centre of the Belgian railway system, which keeps it in touch with France, Germany, and England, it has canals connecting it with Charleroi and the Sambre, and with Antwerp by way of the Rupel, which communicates with the Scheldt at Rupelmonde a few miles above Antwerp. The cradle of the city was a little marshy island called Broeksel, close to the Senne, where there was a church in 610; but it has now grown and extended so as to form with its suburbs a population of over 560,000. The town is divided into the Old or Lower Town, and the new or Upper, which is approached by the street Montagne de la Cour. The lower town is the more ancient, and from an archæological point of view the more interesting, and naturally the more unhealthy; the Upper Town contains most of the public buildings, and the fashionable part of the community. The old fortifications now form a series of boulevards surrounding the town, and a circular railway leads from the chief stations of the north and south to the station de Luxembourg, which terminates the line from Namur, Arlon, and the Grand Duchy of Luxembourg. Brussels is sometimes called a miniature Paris, and Paris is the city which it takes as a model; and though the park at Brussels with its Wauxhall cannot rival the Bois of Paris, it is not without its charms. The Grande Place, with its market and its noble town hall, and surrounded by buildings dating from the Spanish occupation, was the scene of the execution of Counts Egmont and Hoorn, and the Place des Martyrs contains the monument commemorating those who fell in the revolution of 1830. The king's palace is near the park, and a fine street leads from the Place Royale to the new Palais de Justice, one of the finest buildings in Europe, which cost more than £2,000,000. Its surroundings are not yet all that could be desired, since it is situated in a somewhat squalid part of the city; these are being gradually cleared away, and doubtless the quarter will try to live up to the Palais. The terraces of the Palais command a splendid view of the country round Brussels especially in the direction of Soignies, Groenendael, and Waterloo. The Place de la Monnaie contains the Mint, the Exchange, and the Théâtre de la Monnaie. The church of St. Gudule is of the 13th century, and was the scene of the meeting of the first chapter of the Golden Fleece. Its carved pulpit is a wonderfully elaborate structure, and is considered to be the masterpiece of Verbruggen. Brussels has many good fountains and other public

HOTEL DE VILLE, BRUSSELS.

monuments, among which is the quaint little Mannekin Pis, who is said to be the oldest citizen of the town, and wears a special dress upon gala days. The Allée Verte in the Lower Town is an agreeable promenade, which runs parallel with the Mechlin canal, and leads towards Laeken, where the royal family chiefly reside. A visit to Brussels would not be complete without seeing the Musée Wiertz, in the Quartier Léopold, containing the weird pictures of the most eccentric of Belgian painters. The Quartier Marollien, too, is worth a visit if it is only to hear the curious patois, said to be a mixture of Spanish, Flemish, English, and Walloon, and throwing a curious light on the past history of Brussels. The town is of considerable manufacturing importance, among its industries being the making of steam-engines and railway material, refining of sugar, the working of cotton and wool, porcelain, and the brewing of beer, especially the noted Lambic and Faro. The Brussels carpets are chiefly made elsewhere; but a good deal of Brussels lace is really made in Brussels and the neighbourhood. There is also a good deal of carriage building. It was under Charles V. that Brussels became the capital of the Netherlands; and for the fifteen years between the downfall of Napoleon and the revolution, the Hague and Brussels were alternately the seat of government. Pop. (1901), 561,782.

Brussels Sprouts, a variety of cabbage, *Brassica oleracea forma gemmifera*, producing numerous small axillary sprouts, like miniature cabbages. It originated in Belgium, and has long been cultivated round Brussels, though not long generally grown in England. It is known to have sprung from the savoy (*forma bullata*), is very hardy, and is one of our most valued winter vegetables.

Brut, or BRUTUS, of date unknown. The grandson or great-grandson of Æneas, who, after many adventures, came to the land now called England, and after warring with and overcoming a race of giants who lived there, gave the land his own name (Britain), and founded the city of New Troy, afterwards called London. At least, so say Geoffrey of Monmouth and other equally veracious historians.

Brutus, LUCIUS JUNIUS, a partly historical, partly legendary, character of Roman history, in the sixth century B.C. He was bitterly opposed to the rule of the Tarquins, as Tarquinius Superbus had put his elder brother to death and had seized his property, and Brutus himself had only escaped death by feigning to be an idiot, whence his name—"The Stupid." When Lucretia was outraged by Sextus Tarquinius and killed herself, Brutus threw aside his feigned idiocy and put himself at the head of the popular movement which drove the Tarquins from Rome. He was one of the first two consuls, then called prætors, and during his tenure of office he sentenced to death his two sons who had had a share in a conspiracy for a restoration of the kings, and watched their execution, thus becoming the example and model for all stern fathers. He fell in single combat with Aruns in the battle that arose from the attempt of the Etruscans to restore the Tarquins. The matrons of Rome mourned for a year "the avenger of woman's honour," and a statue in the Capitol was decreed to him.

Brutus, MARCUS JUNIUS (85 B.C.–42 B.C.), a descendant of the Brutus above mentioned, who was educated carefully, and at first practised as an advocate. In the civil war which then raged he espoused the side of Pompey, although the latter had ordered the death of Brutus's father. After the downfall of Pompey, Julius Cæsar took Brutus into favour and subsequently appointed him governor of Cisalpine Gaul. Although he appears to have given satisfaction in his government, the profession of politics was not his vocation, and like many other studious men who adopt that line, his theories lacked the tempering alloy of practical wisdom, and he became a dangerous visionary ready at once as a tool to the hand of the crafty Cassius, who lured him into the plot against the life of Cæsar, his benefactor and intimate friend. Forced by popular opinion to fly from Rome, he with Cassius held the province of Macedonia against Antony and Augustus, but his defeat at the battle of Philippi caused him to throw himself upon his sword to avoid being taken prisoner.

Brux, a city of the Austrian kingdom of Bohemia, on the river Bila, 70 miles from Prague. It consists of the old town and three suburbs, and is in the neighbourhood of extensive coal-pits, and of mineral springs, including the famous one of Seidlitz. The inhabitants are largely employed in working the coal, and in preparing the salts for exportation.

Bryant, JACOB (1715–1804), an English man of letters, educated at Eton and at King's College, Cambridge, where he graduated (B.A. 1740 and M.A. 1744). He returned to Eton as private tutor of the Marquis of Blandford, and accompanied him, when Duke of Marlborough, to the Continent as private secretary. On his return after the Duke's death he received an appointment in the Ordnance, and was able to devote himself to his favourite pursuit of literature. He was a voluminous writer on mythology and its interpretation, and on classical and Biblical antiquities, but none of his writings has any permanent value.

Bryant, WILLIAM CULLEN (1794–1878), American poet and journalist, born at Cummington in Massachusetts. He was trained for the bar, but soon abandoned it for literature, and especially journalism. In 1825 he edited the *New York Review*, and afterwards became assistant-editor, and in 1829 editor-in-chief of the *Evening Post*. He took a considerable part in the controversy upon the slavery question, being upon the anti-slavery side. His poems have had much success in America, though they cannot be said to have made much way in England.

Brydges, SIR SAMUEL EGERTON (1762–1837), an English antiquary and general man of letters. He was born at Wootton House, in Kent, and was educated at Maidstone, Canterbury, and Queen's College, Cambridge, and was called to the bar, but

devoted himself chiefly to literature. He raised an unsuccessful claim (or rather persuaded his brother to do so) to the barony of Chandos, but in 1814 he received a baronetcy. He sat for six years in Parliament for the borough of Maidstone, but in 1818 he went abroad and spent most of the rest of his life there, dying eventually at Geneva. He was a voluminous writer, publishing both novels and poetry, and he also did more useful work as an editor, bringing out, among other things, some small editions of rare Elizabethan works, and a *Censura Literaria* of old English books, with other works of antiquarian interest. He also published an autobiography.

Bryony, the popular name of two very dissimilar British climbing plants, *Bryonia dioica*, the white or red bryony, a cucurbitaceous plant, and *Tamus communis*, the black bryony, belonging to the monocotyledonous order *Dioscoreaceæ*. The white bryony, the only British cucurbitad, has a tuberous underground stem; downy, edible, annual shoots, resembling asparagus when boiled; tendrils; angular, light-green leaves; diœcious or monœcious greenish-yellow pentamerous flowers with sinuous anthers and a scarlet berry. The tuber and fruit are acrid, emetic and purgative, and the former is sometimes sold by herbalists as "mandrake." The black bryony, the only British representative of the yams (*Dioscoreaceæ*), has also an acrid tuber which sends up shoots that are edible when boiled. It climbs by twining, having no tendrils; has heart-shaped, acuminate, glossy dark-green leaves, which turn bronze-purple in autumn; inconspicuous trimerous flowers in greenish racemes and red berries. The name bryony comes from the Greek *bruo*, to grow, in allusion to the rapid growth of the annual shoots.

Bryophyllum, a genus of plants belonging to the *Crassulaceæ* or house-leek family, having a bell-shaped, four-cleft calyx, tetramerous corolla and numerous glands at the base of its carpels. The best-known species is *B. calycinum*, a native of Madagascar, Mauritius, and the Moluccas, the fleshy pinnately-lobed leaves of which form buds at the notches on their margins capable of growing into new plants. This case has often been quoted in illustration of the foliar nature of carpels and the homology of most ovules with marginal buds.

Bryophyta, or MUSCINEÆ, one of the main divisions or sub-kingdoms of the vegetable kingdom, ranking in any linear treatment next above the Thallophyta, or Algæ and Fungi, and below the Pteridophyta, or ferns and fern-allies. They agree with the Thallophytes in having only cellular tissue; but many cells in the leaves and stems of *Sphagnum* and some other mosses have spiral thickening-bands, as have also the remarkable long fusiform cells known as "elaters," which occur with the spores in most Hepaticæ, or liverworts. The leaves of mosses have also a long central cell foreshadowing the midrib, and in some of the higher forms there is also an axial strand resembling the procambium of vascular plants. Though the leaves of hepatics and of most mosses are only one cell thick, a distinct "epidermis" with "stomata" or transpiration-spores is differentiated on some moss-capsules. The marked distinction between stem and leaf separates the Bryophyta from almost all thallophytes, though in the *Marchantiaceæ*, or liverworts proper, the stem is thalloid. Growth by "innovations," or new shoots becoming detached by the decay of their bases, is common among bryophytes, as among algæ; whilst the asexual production of "gemmæ," or small groups of cells capable of growing into new plants, is particularly characteristic of the sub-kingdom. The function of roots is performed in this group by simple hair-like bodies, and the leaves never have the complex branching familiar to us in the ferns. From the Pteridophyta the Bryophyta are separated in the most marked manner by the nature of their "alternation of generations." The spore of a bryophyte generally contains chlorophyll, and on germinating on moist earth gives rise to branching green filaments, or *protonema*, on which buds arise which develop into the leafy plant. The reproductive organs, or *antheridia* and *archegonia*, are developed on branches of this leafy plant, which is, therefore, the *oophore* stage, and not the *sporophore* or spore-bearing stage, as is the leafy plant in Pteridophyta. The sporophore stage in Bryophyta is a mere insignificant appendage to the oophore, being little more than the so-called "capsule" or "moss-fruit," whilst in Pteridophyta it is the oophore stage, the prothallus, that is small and transitory. The archegonium in Bryophyta is flask-shaped, with a long neck, and the antheridium is an ovoid or club-shaped body with a wall one cell thick enclosing numerous *spermatocytes*, or mother-cells, each of which gives rise to one spirally-coiled antherozoid. The antherozoids of thallophytes are not coiled, and those of pteridophytes generally more coiled. The archegonia and antheridia of bryophytes are generally accompanied by barren hair-like bodies or *paraphyses* and surrounded by special *perichætial* leaves. On fertilisation the central cell of the archegonium does not give rise to cotyledon and radicle, as in ferns and flowering plants, but to a mass of cells or embryo imbedded in, but not united to, the tissue of the oophore, which grows into the spore-containing capsule and its stalk or *seta*. The archegonium is ruptured, forming a cup or *vaginule* below the seta or a cap or *calyptra* over the capsule. The classes into which the sub-kingdom Bryophyta is divided are the *Hepaticæ*, or liverworts, the *Musci*, or mosses, and, perhaps, the *Characeæ* (q.v.).

Bryozoa, a class usually placed near the Brachiopoda, but of which the exact position in the animal kingdom is as yet undecided. Except one genus (*Lwosoma*) the members of this class are compound, and live in colonies which may encrust shells or stones, but which more often grow into irregular plant-like tufts; when, as is the case with most of the English species, the skeleton is composed of the horny material known as "chitin," the colonies are usually mistaken for seaweeds. In their mode of life they also closely resemble the Zoophytes of

the class HYDROZOA, and it was not till 1830 that their great differences were first discovered by Thompson of Cork; the term "Polyzoa" which he used in describing them is, by some English authors, adopted as the name of the class.

Though the colonies (or "polyzoaria," as the whole skeletons are called) are often of considerable size, the separate individuals (zooids or polypites) are minute. Each zooid is composed of two coats forming a small sac, open at one end; here are placed the mouth and anus; around the former (in the Ectoprocta) or around both (in the Entoprocta) is a circle or crescent of arms, forming the "lophophore;" by the lashing of the cilia (q.v.) with which the arms are clothed, currents of water are set up, by which the food is obtained and respiration effected. The outer coat (ectocyst) may be calcareous, chitinous, or gelatinous. It was at one time suggested that the zooid, as here described, consisted of two individuals, the cell or *Cystid*, and the digestive animal or *Polypid*. Though this is improbable, a certain amount of *dimorphism* (*i.e.* specialisation of certain individuals for special functions) does occur; thus some zooids are modified into "avicularia" (q.v.) or "bird's-head processes," others into "vibracula," (q.v.) and others into "oecia," or chambers which serve as marsupial pouches for the protection of the eggs. In some fresh water species reproduction sometimes occurs by "statoblasts," *i.e.* winter eggs which are not fertilised and may be regarded as internal buds. The larvæ undergo a metamorphosis. The Bryozoa are mainly marine. The position of the class in the animal kingdom is rendered doubtful owing to some peculiar forms which some authors include among the lower Chordata (q.v.); such are the two remarkable genera that form the group of the PTEROBRANCHIA, and *Phoronis*, the only genus of the VERMIFORMIA, but it is probable these are not as closely related to the true Bryozoa as was once thought. The true Bryozoa are divided into two groups, the ENTOPROCTA and the ECTOPROCTA, to which reference should be made for the further subdivisions.

Brzezan, a town of Galicia in Austria, near the river Zhota-Lipa, and about 50 miles S.E. of Lemberg. It has a considerable trade in leather, linen, beer, and brandy. It has Roman Catholic, Greek, and Armenian churches, as well as a castle, a convent, and a gymnasium.

Bubaline Antelope (*Alcephalus bubalis*), formerly made the type of a genus (Bubalis), a large reddish-brown antelope from North Africa. The name is sometimes extended to the Hartebeest (*A. caama*, a somewhat larger form with a black mark on the face and black tail) and the Sassaby or Bastard Hartebeest (*A. lunatus*, purplish-brown above, dusky yellow on the under-surface), both from South Africa.

Bubastis, the name of an Egyptian goddess, and of a city founded in her honour and called after her, and variously considered to have held the same position in the Pantheon as Artemis, or Athene, or Aphrodite. In the triad of the gods of Memphis, she, under the name of Bast, was the wife of Ptah, and had a sister Pasht or Sekhet. Some consider her to have represented the beneficent aspect of fire, others hold that she symbolised sexual passion—a view which seems to be the more probable. Many figures in porcelain of her as a cat-headed goddess have been found both at Bubastis and elsewhere, and some bronze coins of the 2nd century have figures of a goddess holding in her hand a cat-like animal.

Bubble Shells, belonging to the genus *Bulla*, the type of the family *Bullidæ*; they are *Gasteropoda* of the group *Opisthobranchia*; they are now widely distributed, and have lived since Oolitic times.

Bubo. [OWL.]

Bubo, a term applied to the swelling caused by inflammation of the lymphatic glands of the groin or axilla.

Buccaneers (Fr. *Boucaniers*, from *boucan*, the smoke-dried flesh of the wild ox, a staple food and article of trade among these people) were the sea-rovers of the West Indies during the 17th and early 18th centuries. At one period most of them were French. In 1625 they seized the island of St. Christopher, whence they preyed upon the merchant fleets of Spain. About the year 1630 they also possessed themselves of the northern portion of the then Spanish island of San Domingo, and formed a kind of pirate republic. As they were troublesome in the highest degree to Spanish commerce, they were officially, though not always openly, favoured by France, and afterwards by Great Britain. Their occupation was taken from them by the provisions of the treaty of Ryswick in 1697; and thenceforward, wherever they existed, they were pirates, and equally the enemies of all maritime nations. The most notable of them were Montbars, Peter of Dieppe, Raveneau de Lussan, François l'Olonnais, Bartolommeo Portuguez, Mansvelt, Henry Morgan, Richard Sawkins, William Dampier, and Basil Ringrove. Many of them rendered valuable service as explorers and navigators, and some, like Dampier, and Morgan (who became lieutenant-governor of Jamaica, and was knighted) ended their lives in lawful pursuits. The vessels of the buccaneers were, moreover, valuable schools for seamen.

Buccinum. [WHELK.]

Bucentaur, the ancient state galley of the Doges of Venice, measured 100 ft. by 21 ft., and was manned by 168 rowers, rowing four to an oar, and by 40 seamen. It was specially used for the annual ceremony, performed by the Doge, of "wedding the Adriatic."

Bucephalus, the name of the horse of Alexander the Great, who built a town over its remains when it died from a wound.

Bucer, MARTIN (1491–1551), a German reformer, born near Strasburg, and, becoming a Dominican at 15, went to Heidelberg to carry on his studies. He here studied the works of Erasmus and Luther, and was present at a disputation held by the latter. He joined the Reformed Church, and

married a nun, and took an active part in the affairs of the Reforming party, though he did not entirely agree in views with either Luther or Zwingli. In 1549 he came to England at the invitation of Archbishop Cranmer, and was appointed to teach theology at Cambridge, where he died and was buried, to be exhumed and burnt a few years later. His tomb was also demolished, but was rebuilt in Queen Elizabeth's reign.

Buceros. [HORNBILL.]

Buch, LEOPOLD VON (1774–1853), a German geographer and geologist. He studied at the Mining school of Freiberg under Werner, having as a fellow student Alexander von Humboldt. He joined with Humboldt in studying the geological formation of his own country, afterwards extending his researches to Italy, France, Scandinavia, the Canary Islands, and parts of Great Britain and Ireland. His examination of volcanoes and volcanic action led him to abandon the Neptunian theory of Werner for the theory that volcanic agency had much to do with the formation of the present features of the world. He established the fact that Sweden is steadily rising, and was of opinion that the South Sea islands are the remains of a former continent. Humboldt considered him the greatest geologist of his time. Besides books of travels and other geological works, he published in 1832 a *Geological Map of Germany*.

Buchan, a district in the N.E. of Aberdeenshire, between the Deveron and the Ythan. In parts the coast is high and abrupt, and the rock scenery magnificent. To the S. of Peterhead the sea enters through a natural archway into a well 50 ft. in diameter and 100 ft. deep, called the Bullers of Buchan. The Comyns were earls of Buchan, but forfeited the title in 1309. Buchan Ness, three miles S. of Peterhead, is the easternmost point of Scotland.

Buchan, DAVID, born 1780, British sailor and explorer, entered the navy, and was a lieutenant in 1806. In 1810 he had command of a schooner on the Newfoundland station, and the next year went on an exploring expedition into the interior. In 1818 he started upon a Polar expedition with the ships *Dorothea* and *Trent*, but could not get farther than Spitzbergen. After a few more years upon the Newfoundland station he started upon another northern voyage, and never came back, and his name was struck off the navy list in 1839.

Buchan, PETER (1790–1854), a printer and collector of Scottish ballads. He was born at Peterhead, and after publishing a volume of poems, and teaching himself the art of engraving and that of printing, he set up at Peterhead as a printer in 1816, where, with the exception of a short time spent in London, he carried on a successful business. In 1828 he published *Ancient Ballads and Songs of the North of Scotland*, a collection of forty new ballads, and some fresh versions of ballads printed elsewhere. He also wrote several books, among them *The Annals of Peterhead*.

Buchanan, CLAUDIUS (1756–1815), born near Glasgow, and studied at Glasgow and Cambridge, was the pioneer in the work of trying to Christianise India. In 1797 he was appointed to a chaplaincy in the East India Company's service, and was stationed at Barrackpur. Here he studied Hindustani and Persian, and in 1799 went to Calcutta, where he was vice-provost of the college at Fort William. After translating the Gospels into Hindustani and Persian, and making tours in S. and W. India, he returned in 1808 to England, and succeeded so far, by preaching and by editing *The Star of the East*, in interesting the country in the subject of India, that he lived to see the first English Bishop of Calcutta appointed.

Buchanan, GEORGE (1506–1582), Scottish scholar and historian, was educated partly in Scotland and partly in Paris. He took the degree of M.A. at Paris in 1528, and for three years was professor in the College of St. Barbe, and then becoming, in 1532, the friend and tutor of Gilbert Kennedy, Earl of Cassilis, he returned with his pupil to Scotland in 1537. Here, with the approval of the king, who made him tutor of one of his sons, he wrote the *Somnium* and the *Franciscanus*, both of them attacks upon monastic life in general and upon the Franciscans in particular. This gained him the enmity of Cardinal Beaton, and after some persecution he fled to Paris, and from there to Bordeaux, where he was made professor of Latin at the College of Guienne. It was at this time that he made translations from *Medea* and *Alcestis*, and wrote two dramas, *Jephthah* and the *Baptist*. From 1544 to 1547 he was again in Paris, and from there he went to the Portuguese university of Coimbra. Here he suffered imprisonment in a monastery at the hands of the Inquisition, and began a version of the Psalms. After another period of tuition in Paris he came back to Scotland, and in 1562 was appointed tutor of Queen Mary, and in 1566—having now joined the Reformed Church—he was appointed principal of St. Leonard's College, St. Andrews, by the Earl of Murray, and in the next year was, though a layman, made moderator of the General Assembly. In 1570 he was appointed tutor of James VI., and was for a time director of Chancery and Lord Privy Seal. In the question between the queen and her brother Murray, Buchanan was a partisan of the latter, and his *Detectio Mariæ Reginæ* was bitter against her. Of his works the most famous are a treatise *De Jure Regni*, which lays down the position that kings are created by the people and exist for the good of the people, a work condemned in 1584 and in 1664, and burnt by the scholars at Oxford in 1683; and a *History of Scotland*, which is of value for the period in which the writer makes use of his own personal experience. Buchanan was also possessed of much poetic power, and his translations are of considerable merit, while as a Latin versifier he had a European renown, and has seldom, if ever, been excelled.

Buchanan, JAMES (1791–1868), American statesman, and fifteenth president of the United States, was born in Pennsylvania, and was the son

of an Irish farmer who had emigrated from Donegal. Educated for the bar, he obtained a large practice, in 1814 became a member of the State Legislature, and in 1820 was returned as a member of Congress. In 1828 he was a supporter of General Jackson for the presidential election, and the next year he was head of the judiciary committee of the House, in which capacity he conducted the impeachment of Judge Peck, a "leading case" in U.S. constitutional history. In 1832 as envoy to Russia he had a share in making the first commercial treaty between Russia and the United States. On his return he became a senator, and in 1845 he was secretary of state under President Polk, and in 1853 United States ambassador to Great Britain. In 1856 he returned from England and was elected president. It was during his administration that the troubles between the North and the South came to a head, he himself siding with the pro-slavery party. After the end of his term of office Mr. Buchanan took no further part in public affairs; but in 1866 he published an account of his administration.

Buchanan, ROBERT, born in Warwickshire in 1841, a contemporary critic and writer in prose and poetry. Educated at Glasgow University, he was a great friend of David Gray, and has himself told us with what high hopes the pair set out for London, and how far these high hopes were defeated. Besides many poems, dramas, and novels, Mr. Buchanan wrote much in magazines, and displayed a happy talent for embroiling himself in controversy, as witnessed by his attack upon Dante Gabriel Rossetti—answered by Mr. Swinburne. He died in 1901.

Buchanites, a sect of fanatics which was founded in the 18th century by a Mrs. Buchan, of Banff. She advocated very extraordinary religious views, and by these attracted for a time a few followers. They are said to have lived in total disregard of morality; they speedily died out after Mrs. Buchan's death in 1791.

Bucharest, the capital of Roumania, is situated in the valley of the Dimbovitza, a tributary of the Danube, in lat. 44° 25′ N., and long. 26° 5′ E. It is a picturesque city by reason of its many cupolas, minarets, and trees, but is badly built, and is only partly paved. It is the meeting-place of east and west, and is the principal seat of the trade between Austria and the Balkan peninsula, though it has no important manufactures of its own. The chief articles of trade are cattle, coal, grain, hides, metal, timber and textile fabrics. The town is fortified, and is making some progress, and it has the reputation of being the most dissipated capital of Europe—a fact that may be owing to its cosmopolitan nature. The railway system is quite young, but is rapidly extending. Founded in the 13th century, Bucharest was for a long period a bone of contention among Russia, Austria, and Turkey, and although things are now more settled, its future seems far from being secured.

Buchez, PHILIPPE JOSEPH BENJAMIN (1796–1865). French author and politician, was born in the Ardennes, and after a course of general education at Paris, devoted himself to natural philosophy and medicine. To his studies he united a hankering after politics and social science. He became mixed up with a secret society and was concerned in a plot against the reigning family which came near costing him his life. About 1825 he joined the St. Simonian society, and contributed to its journal, *Le Producteur*. Leaving this society, he started a periodical called *L'Européen*, to advocate a system of Christian socialism, and he collaborated in the production of a *Parliamentary History of the French Revolution*, a work of considerable historical value. After the revolution of 1848 he was for a time president of the National Assembly, but soon showed that he was not fitted for an active life, and returned to his studies. Beyond taking a share in writing a treatise on hygiene, he seems to have had little to do with strictly medical questions. In 1839 he published a treatise dealing with philosophy from a Catholic and progressive point of view, and seems to have aimed at a unification of the different branches of science. One of his earliest works was an attempt to elaborate a science of history, and one of his latest, a treatise on politics, which may be regarded as the complement of the philosophical treatise above-mentioned.

Buchner, LUDWIG, German physician and materialist, was born at Darmstadt, 1824, and after studying at different universities, became a lecturer at the University of Tübingen. In consequence of his publication of a work entitled *Kraft und Stoff*, in which he set forth a materialistic theory of the universe, he lost his university post and betook himself to the practice of medicine. Among the rest of his works are, *Natur und Geist*, *Aus Natur und Wissenschaft*, a translation of Lyell's *Antiquity of Man*, and treatises on Darwinism, the idea of God, and intelligence in animals.

Buchu, or BUCKU, the Hottentot name, adopted in medicine since 1821, for the leaves of *Barosma crenulata*, *B. crenata*, *B. serratifolia*, and other species, natives of Cape Colony. The genus belongs to the rue family, and takes its name from its heavy rue-like odour, the evergreen gland-dotted leaves containing a volatile oil and a camphor or stearoptene, reputed to be stimulant, tonic, and diuretic, and to have a specific effect in chronic diseases of the bladder. There are two officinal preparations, infusion and tincture.

Buck, the male of any species of deer, except the Red-deer. [HART, STAG.] Applied attributively to the males of goat, rabbit, etc.

Buckau, in Prussian Saxony, is practically a suburb of Magdeburg, and is almost entirely taken up with manufactures.

Buck-bean, BOG-BEAN, or MARSH TREFOIL (*Menyanthes trifoliata*), a beautiful British plant, occurring also from Siberia and N.W. India into North America, the only species of a genus of the gentian family. It has a creeping, starchy, perennial rhizome; fleshy ternate leaves something like the leaflets of the broad-bean; a racemose scape of pentamerous flowers with petals delicately

fringed, pink outside and white within; and a one-chambered capsule bursting into two valves. It grows in wet bogs or pools, reaching an altitude of 1,800 ft. in the Lake district. In Lapland the rhizome is used as a bread-stuff in times of scarcity; and as the plant shares the bitter tonic properties of the rest of the family, its leaves are used in Silesia as a substitute for hops, as they were formerly in Sweden, whilst they once had a reputation as a febrifuge and a remedy for gout and rheumatism.

Buckingham, a market town and municipal borough on the left bank of the river Ouse, about 60 miles from London, and ranking as the capital of the county of Bucks. It is a town of great antiquity, was fortified by Edward the Elder in 918, and was captured by the Danes in 1010. It is mentioned in Domesday, and was of importance in the days of Edward III. as a wool staple, and in the reign of Henry VIII. it became a parliamentary borough, and sent two members to Parliament till 1868, when its representation was reduced to one member, and since 1885 it sends no member to Parliament. The Ouse almost surrounds the town, and is crossed by three bridges. There are no manufactures of great importance in Buckingham, the chief being bone-grinding, malting, and tanning, and a certain amount of lace-making is carried on in the neighbourhood. The town consists principally of one long straggling street, and has no public buildings of great note beyond the modern (1781) church with a fine spire, and a town hall, also of the eighteenth century. There is an endowed free school, now incorporated with the national school, and a grammar school of Edward VI.'s time. The town gave the title of Earl to William Giffard in William I.'s reign, and also to a son of Edward III., as well as to Marquises and Dukes of Buckingham of later dates Pop. (1901), 3,151.

Buckingham, GEORGE VILLIERS, DUKE OF (1592–1628), the third son of Sir George Villiers, courtier and favourite of James I. and Charles I. The former of these kings successively knighted him and made him a Viscount in 1616, and Marquis of Buckingham in 1618. The courtier played his cards so well that he became one of the wealthiest nobles of England, and had the greatest influence with the Prince of Wales, and with the king his father, and having married a rich heiress, and proved himself a formidable rival to Bacon in the king's favour, he deserted the popular anti-Spanish cause, the advocacy of which had just brought him into favour, and threw himself entirely into the hands of Spain. It was doubtless by his influence that the prince and he made their expedition to Madrid, with a view to the marriage of the prince to the Spanish Infanta, and it was also probably under his influence that the determination was made to open negotiations with France, and to bring about the marriage of Charles and Henrietta Maria of France. The deep offence that his rashness in politics had given to the Commons was the great cause that embroiled James I. with his later parliaments, and led to the first dissolution of his parliament by the new King Charles I. Then followed the useless expedition to Cadiz, and the impeachment of Buckingham by the new parliament. The Duke's unsuccessful expedition to the Isle of Rhé and his active opposition to the Petition of Right still further incensed parliament against him, and led to another dissolution. Then followed the last projected expedition for the relief of Rochelle, which was brought to a sudden end by the assassination of the Duke at Portsmouth by John Felton. The Duke of Buckingham to a boundless conceit and ambition seems to have united a buoyancy of temperament and a winningness of manner that carried all before it, and led many to have almost as much belief in him as he had in himself. His nature was particularly one to fascinate a romancer, and, though not strictly historical, it is likely that Sir Walter Scott's sketch of him in *The Fortunes of Nigel*, and that of Dumas in *The Three Musketeers*, gives us as good an idea of the man as we are likely to find elsewhere.

Buckingham, GEORGE VILLIERS, second DUKE OF (1627–1688), after an education at Cambridge and a continental tour, threw in his lot with the Royal cause, and shared in its downfall, and the exciting adventures and hairbreadth escapes of Charles II. He was not without a touch of his father's hardihood and romance, for having lost his estates, which were given by Parliament to Lord Fairfax, he returned secretly to England and married that nobleman's daughter. With the king's return he received the reward of his loyalty and devotion, and became one of the most influential men in the country, doing to it and to the king about as much harm as he possibly could, more perhaps from want of principle and utter fickleness than from any badness of heart. That in common with the king and the rest of the court he was profligate, is, in his case and theirs, as much the fault of those who had driven the king and his friends to a wandering and shiftless life, and had made even the name of virtue hateful in England, as it was the fault of those whom a shiftless life of recklessness had driven into the adoption of a cynical philosophy which stopped at nothing in the gratification of its whims and desires. Buckingham's literary works were of considerable merit, though there was no love lost between him and Dryden, as witness *The Rehearsal*, and Dryden's portrait of Zimri in *Absalom and Ahitophel*.

Buckingham, JAMES SILK (1786–1855), traveller, lecturer, and journalist, was born near Falmouth, and went to sea at an early age. In 1818 he established a journal in Calcutta, and was expelled from Bengal for criticising too freely the Indian Government. He afterwards came to London and established (1824) *The Oriental Herald* and (1828) *The Athenæum*. He then travelled in the United States, and returning to England, represented Sheffield in Parliament for five years. He published several books of travel, and an autobiography.

Buckinghamshire, a county of the south Midlands, 53 miles in greatest length, and varying from 8¼ to 27 miles in breadth, lying between Northamptonshire on the N. and Berkshire on the

S., and having Oxfordshire on the W., and Bedfordshire, Hertfordshire, and Middlesex on the E. The county contains about 730 square miles, and is of varied aspect, having the range of the Chiltern Hills crossing in a north-easterly direction from Oxfordshire, and the fertile valley of Aylesbury to the N. It is chiefly agricultural, and in the vale of Aylesbury a great deal of fattening of cattle and breeding of sheep is carried on, while the Aylesbury ducks are not without renown. The northern part is well-wooded, though the forests of the south, which gave the county its name—from the prevalence of beech-wood—have been in a great measure cleared away. Two great roads pass through Buckingham, the road from London to Chester and Holyhead, and the western road from London to Bath and Bristol—both of which were of considerable importance in the coaching days, though now superseded by the railways. The Grand Junction Canal passes through the county, and of its rivers the Thames—receiving the Colne and the Thame—separates it from Berkshire and Surrey, and the Ouse, with its tributary Ousel, is in the north. The manufactures of Buckinghamshire are not very important, the chief being those of lace and straw-plait, and from returning fourteen members to Parliament in the early part of the nineteenth century, it now returns only three. The old roads Watling Street, Icknield Way, and Akeman Street pass through the county, and it has not been entirely devoid of historical interest. Hampden is buried at Chalfont St. Giles, and here too Milton lived and wrote, while Stoke Poges is said to have inspired Gray's *Elegy*, and Olney is full of reminiscences of Cowper. At Slough Herschel's telescope was erected, and Hughenden calls to our mind Lord Beaconsfield and Edmund Burke, and the poet Waller. The Duke of Buckingham's seat at Stowe is celebrated for its grounds, and was formerly not less so for its art collections, which were, however, sold in 1852; and there are other important seats Pop (1901), 196,844.

Buckland, Francis Trevelyan (1828–1880), surgeon and naturalist, was the son of Dr. Buckland mentioned below, and was educated at Winchester and Christ Church. He made his medical studies at St. George's Hospital, and was for a time assistant-surgeon to the 2nd Life Guards. But it is as a naturalist that he is best known, both from his writings and his lectures, and the countless anecdotes of his sayings and doings with regard to the animal world, which provided the most valued companions of his daily life. He contributed largely to the *Field* and other papers, and in 1866 originated *Land and Water*, perhaps the most fascinating of all the sporting papers, since in it science is treated rather as the mistress of sport than as its handmaid. His *Curiosities of Animal Life and History* and his *Notes and Jottings of Animal Life* are full of vivid interest, and there are few boys, whether of smaller or larger growth, to whom the name of Frank Buckland is not familiar. He interested himself greatly in fishes, and, besides starting the Museum of Economic Fish Culture, was an inspector of salmon fisheries, and was a special commissioner on the salmon fisheries and the herring fisheries of Scotland.

Buckland, William, one of the pioneers of English geology, was born at Axminster in 1784, and educated at Tiverton grammar school, Winchester, and Corpus Christi College, Oxford, from which he graduated B.A. in 1805. In 1813 he succeeded Dr. Kidd as reader in mineralogy, and in 1818 became the first reader in geology in the University, being made F.R.S. in the same year. In 1824 he acted as president to the then newly-established Geological Society, as he did also in 1840, about which time he prominently supported Agassiz in his exposition of the former importance of ice as a geological agent in Britain. In 1825 Buckland became Canon of Christ Church and Rector of Stoke Charity, Hants, at the same time proceeding D.D., and in 1845 he was promoted to the deanery of Westminster and rectory of Islip, Oxfordshire. He died in 1856, and was buried at Islip. His chief separate works were *Reliquiæ Diluvianæ*, 1823, and the *Bridgewater Treatise* on geology and mineralogy, 1836. He was a man of wide sympathies, interested, for example, in agriculture and in sanitation, and was an excellent teacher. His collections, to the accumulation of which he had been enthusiastically devoted, were bequeathed to his university. His name is perpetuated both in that of a recent plant and in that of a fossil cycad. His love of nature was largely inherited by his son Frank, the founder and for many years the editor of *Land and Water*.

Buckle, a link of metal with a tongue or a catch, used to fasten one thing to another, as in a strap. At one time buckles were used instead of shoe-strings; and their manufacture soon became an important industry. At the close of the 18th century, however, fashion changed again, and the general use of buckles died out.

Buckle, Henry Thomas (1821–1862), an English historian, who, self-educated, as it is called, that is, going to no school and to no university, owed, like many another man of renown, much of his inspiration to his mother, and who must in strictness be judged by what he attempted rather than by what he accomplished. His weak health inclined him to a studious life, and his possession of ample means enabled him to gratify his tastes. But instead of giving himself up to a life of a luxurious dilettantism he addressed himself to no less gigantic a task than that of writing the *History of Civilisation in England*, and underwent years of assiduous labour in amassing materials for the work. He seems to have had an idea of discovering such fixed and necessary laws of social development as should make it a fixed method; but his own method was far from being scientific, and he displays not only inconsistency, but an inability to admit the force of facts that were hostile to his own theory. His position that scepticism is the main lever in social progress may be true in the same way that it is true that discontent is a great incentive to individual advancement, but what has been called his "physical fatalism" has caused him unduly to exaggerate

the force of external conditions. His work did not proceed so far as to enter upon the particular treatment of civilisation in England, nor even so far as to make a general examination of progress in England, Scotland, France, Germany, Spain, and America, which was part of his plan. The first volume of his work appeared in 1857 and the second in 1861, but his health had been impaired by grief at his mother's death, and, after a few months' wandering in Egypt and Palestine, he died of fever at Damascus. Of his other works may be mentioned a lecture delivered at the Royal Institution in 1853, on the *Influence of Women on the Progress of Knowledge*, and a review of J. S. Mill's *Essay on Liberty*, in which he adduces as an argument for immortality the yearning for communion with those who are gone, although elsewhere he sets little value upon the testimony of consciousness. His *Miscellaneous and Posthumous Works* have been published in 1872 and in 1880.

Buckram, a kind of coarse linen cloth, stiffened with gum, used by tailors and milliners to fix the shape of bonnets, collars, belts, etc.

Buckstone, JOHN BALDWIN (1802–1879), comedian and dramatic writer, made his first appearance upon the London stage, after a short provincial experience, in 1823, at the Surrey theatre. From 1827 to 1833 he was leading low comedian at the Adelphi, whence he migrated to the Haymarket, which was the chief scene of his subsequent labours, and of which he was lessee from 1853 to 1878. He also played for short intervals at the Lyceum and at Drury Lane, and in 1840 he visited the United States. As a writer he produced 150 pieces, some of which have been very popular; and as an actor his special merit was the distinct individuality which he could throw into his different characters.

Buckthorn, the English name for the species of *Rhamnus*, the typical genus of the order *Rhamnaceæ*, which are mostly spinous shrubs, and two of which, *R. catharticus* and *R. frangula*, are natives of Britain. They are mostly natives of the northern temperate zone, and have simple, petiolate, glabrous, pinnately-veined leaves; axillary clusters of greenish, often unisexual flowers; and a drupaceous fruit containing two, three or four one-seeded stones or pyrenes. *R. catharticus*, the purging buckthorn, has its branches terminated by spines, and its flowers tetramerous. Its bark and fruit are violently purgative; but the latter is collected in Herts, Bucks, and Oxfordshire for the manufacture of the medicinal syrup of Buckthorn (the officinal preparation is the syrupus rhamni), and of the pigment known as sap or bladder-green. This is made by mixing the fresh juice with lime. *R. frangula* has no spines and pentamerous flowers, and, as its foliage resembles that of the alder, it is called alder buckthorn or berry-bearing alder. Its wood, known as "dog-wood," is in request for gunpowder charcoal. Yellow or Persian berries are the unripe fruits of *R. infectorius*, imported from Smyrna; Avignon berries, the same species from South France, both being used in calico printing. Chinese green indigo or Lo-kao, used in dyeing Lyons silk, is prepared from the bark of *R. utilis* and *R. chlorophorus*; and the safer cathartic known as Cascara Sagrada ("sacred bark") from that of *R. Purshianus*.

Buckwheat, *Fagopyrum esculentum*, a member of the knot-grass order (*Polygonaceæ*), derives both its English and its Latin name from the resemblance of its small three-sided farinaceous fruit to a miniature beech-mast. It is a branched annual herb, seldom more than two feet high, native to Central Asia, but long extensively cultivated and often naturalised in Europe and the United States. Though far less nutritious than wheat, it is used for human food, its flour being made into thin cakes; but in England it is only grown to a small extent as food for pheasants.

Bucolics, pastoral poems. Virgil's *Eclogues* are sometimes called "bucolics."

Bud, an undeveloped shoot or apex of an ascending axis overlapped by rudimentary leaves. Buds are mainly confined to the stems of flowering plants (Phanerogams); but an approach to this structure occurs in *Chara* and in ferns, whilst a few roots, such as those of the Japanese anemone (*Anemone japonica*) and of the birdsnest orchis (*Neottia Nidus-avis*), normally produce buds, and others do so when the main stem of the plant is removed. The stem of phanerogams originates in a bud, the *plumule* of the embryo, and as long as its growth (or that of any of its branches) continues it is terminated by a bud, the *terminal* or *apical bud*. Lateral buds are mainly produced in the axils of leaves, though only abnormally in those of floral leaves, as in *Cardamine pratensis*. Several buds may originate in one axil, as in the honeysuckle, or the axillary bud may be concealed within the sheathing base of the leaf, as in the plane. Buds may also originate elsewhere than in the axils, as on the cut end of a pollard tree, at any wound, or even on leaves, as in *Bryophyllum* (q.v.), and many "proliferous ferns," or the cut edges of Begonia leaves. Buds may become detached and reproduce the plant, as in the "cloves" produced in the axils of the scales of bulbs, or in the green bulbils in the axils of the foliage-leaves of *Lilium bulbiferum*, the Tiger-lily, or of the bracts of the inflorescence in some onions (*Allium*). Buds may develop into flowers or into leafy shoots, and in the earlier stages of their development there is nothing to distinguish leaf-bud from flower-bud, and their future development may even be determined by appropriate cultural treatment. Thus abundant stimulating liquid food may make many buds develop into branches, the plant "running to leaf," whilst conversely a check to nutrition, such as root-pruning, may determine many young buds to become flower-buds, a flower being merely a branch with undeveloped internodes and specially modified leaves. The leaves in a bud, as a rule, grow at first more rapidly on their under surfaces (*hyponasty*), which causes them to arch over the growing-point. As the growth of the upper surface predominates (*epinasty*), they spread out horizontally. The outer

leaves of buds are often hairy or viscid, as a protection against cold, and such leaves as are outermost during winter or other period of vegetative rest commonly drop off without any elongation of the internodes between them, so that each new growth of an axis has several close-set leaf-scars at its base. These deciduous *bud-scales* or *perulæ* may be of various morphological origin, being sometimes leaf-sheaths, as in the gooseberry, sometimes stipules, as in the linden, and sometimes leaf-blades. The folding of the leaves in a foliage-bud is termed *vernation* (q.v.); that in a flower-bud *æstivation* (q.v.).

Just as an entire shoot is transferred from one plant to another in the process of grafting (q.v.), so it is possible to remove a bud, or young exogenous lateral axis, uninjured from one plant, and transplant it, so to say, on to another, known as the *stock*, so as to bring their two cambium or growing layers into contact, when the bud will be nourished by the stock, at the same time retaining its specific character. This is termed *budding*. Thus any particular variety, say of *Rosa damascena*, may be budded on a stock of the wild briar, *R. canina*, retaining in the subsequent growth beyond the point of union all its characters. The bud or *scion* lives like a parasite on the stock. Similarly special buds or branches of plants are said to have sometimes exhibited peculiar structures by a spontaneous *bud-variation*, as it has been termed. The nectarine is said to have originated in this way on the peach, and the moss rose on the ordinary damask rose.

Budæus (Budé), Guillaume (1467–1540), a French scholar who, after a stormy youth, devoted himself to literature, and produced many works in philology, philosophy, and jurisprudence. He was much esteemed by Francis I., who at his suggestion founded the Royal College of France for the teaching of sciences and languages, and also refrained from prohibiting printing, a course which had been advised by the Sorbonne. The king sent him to Rome as ambassador to Leo X., and made him Master of Requests in 1522. Of his works the best known are a treatise, *De Asse*, etc., which deals comprehensively with ancient coinage, and his *Commentarii Linguæ Græcæ*.

Budaun, a district of British India in the Rohilcund division, and in the jurisdiction of the North-West Provinces, having an area of about 2,000 sq. miles, and forming a level tract of country, watered by the Ganges and some of its tributaries. The district was ceded to the English by the Nawab of Oude in 1801, and in 1837 it took the rebel side in the Indian Mutiny.

Buddha, the name or rather the title of the founder of the religious system called Buddhism. According to the Buddhist books, Siddhartha, the son of an Indian prince, in the fifth century B.C., had a tendency to a life of asceticism. His father, with a view to weaning him from such an untoward fate, married him early and surrounded him with pleasure and luxury. The prince, finding this life insufficient to satisfy the longings of his soul, escaped, and after trying Brahminism with indifferent satisfaction, he gave himself up to six years' asceticism. This too proved to be vanity and vexation, and finally he found in contemplation and abstraction the true counsel of perfection, and realised in his own person that this divine contemplation teaches that existence with all its evils comes from ignorance, and that it is possible to emerge from ignorance and existence, and so reach the perfect state. This knowledge he arrived at as he sat in the seat of intelligence beneath the Bo-tree, or tree of intelligence, and it is in commemoration of this fact that he is represented in his images in a position of cross-legged contemplation. This same Bo-tree was found 1200 years after Buddha's death and after his tenets had begun to lose sway in India, by a Chinese pilgrim, and its place is supposed to be marked near Laya in Bengal by some ruins, especially of a temple, in the courtyard of which is a tree said to be the descendant of the original tree of intelligence.

The name Buddha is from a root meaning "to awake," and seems to signify "the enfranchised one—the man set free from ignorance and existence." He was also called by his family name of *Sakya*, and by his tribal name of *Gautama*, sometimes *Gautama the Ascetic*. Of course, Buddha, like most other half-traditional, half-historical characters, has been credited with being a solar myth, but there seems little reason for doubting his existence. Assuming him to have existed, he taught in Benares, or "turned the wheel," as was said by a confusion of the literal with the secondary meaning of the word for "monarch," and from this "wheel" is thought to come the practice of employing the praying wheel in the Buddhist monasteries of Thibet. He is thought to have travelled through North India, and to have taught the people for about 40 years, dying at Oude at the age of eighty, and being burnt, and finally passing into his already realised Nirwana.

Buddhism, the religion, or system of philosophy, that has been elaborated out of the views taught and held by Buddha, and about which many conflicting opinions have been and are held, some considering it a relic of primeval worship, and others thinking it a more or less conscious imitation of Christianity. But whatever its origin, it is the religion of nearly a quarter of the inhabitants of the globe, and though it has nearly lost its hold in India, except among some races of the north, it prevails in Ceylon, in great part of China, in the Indo-Chinese peninsula, in Thibet, Central Asia, and part of Siberia, and among the Tartar tribes generally.

Taking its rise in Northern India in the fifth century B.C. [Buddha], Buddhism was patronised by some powerful princes, and though animated by no persecuting spirit, proved itself of great missionary capability. In the third century B.C. it was prevailing in Ceylon, in Burmah in the fifth century of our era, and in Siam in the 7th, while it had penetrated to China in 217 B.C., and in the first century A.D. the reigning emperor decreed it the third state-religion in importance. That it had made considerable progress to the north of the

Himalayas is shown by the fact that a Chinese general in 120 B.C. brought back from an expedition into the Desert of Gobi a golden statue of Buddha.

The Chinese always considered India their Holy Land, and it is from Chinese pilgrims that is obtained the knowledge of the state of Buddhism in India, since there is little to be found about it in native literature; and undoubtedly it met with persecution in India, especially in what is now the presidency of Bombay, since of the 900 cave temples in which Buddhism was forced to take refuge, nearly all are in that region. It was Mohammedanism that finally killed Buddhism in India. As Buddha, like Socrates and other great teachers, left no writings, three councils of his followers, soon after his death, settled the doctrines and discipline of the young church. The first was just after Buddha's death; 100 years later came a second council against innovators and heretics, and the third in 244 B.C.—during the reign and under the auspices of a King Asoka of Northern India, who was a great advancer of Buddhism—fixed the canon, which was committed to writing 150 years later. The triple basket, as it has been called, of the canonical writings consists of the *Sutras* for the laity, the *Vinaya*, or discipline for the order, and the *Abhidharma* or metaphysical principles. Of these the first seems the germ from which the rest of the system has probably been evolved, while the existence of a set of metaphysical principles will not appear strange to students of Greek philosophy.

The doctrines are in some points similar to those of Brahmanism. Buddhism holds the doctrine of the transmigration of souls, or the continuance of personal identity; that is, that man passes through successive stages of existence, sometimes higher sometimes lower, the past and present ever having its influence on the future, till at last he reaches the perfect state of Nirwana, as to the nature of which there is some doubt whether it means perfect annihilation or absorption into the general vital or informing principle of the universe. For Buddhism there is no God, but a kind of impersonal Pantheism. It seems to say with the poet:

> "What if all of animated nature
> Be but organic harps diversely framed,
> That tremble into thought as o'er them sweeps
> Plastic and vast, one intellectual breeze,
> At once the soul of each and God of all?"

This hankering after a union of past and future existence seems innate in the race, and men often think they can catch gleams of reminiscence from a brighter world.

The second fundamental point of Buddhism is a thorough-going Pessimism, which regards existence as nothing but misery, and future happiness at the best as only problematical, and even then little more than an escape from existence to annihilation or something very like it. There are four "sublime truths": First, pain exists; second, the cause of pain is desire or attachment partly necessitated by former existence; third, the Nirwana ends pain; fourth, the truth that leads to the Nirwana.

The road to the Nirwana consists of eight things: right views, feelings, words, behaviour, exertion, obedience, memory, meditation. And to aid in attaining to rightness in these eight essentials there are ten commandments, five of them of universal obligation, not to kill, steal, commit adultery, lie or drink; and five others of obligation for those who aim at making decided progress towards the Nirwana. These relate to indulgence in food, amusements, personal ornament and gratification, luxury and wealth; and for fully professed monks the rules are still more severe.

Buddhism inculcates the practice of alms-giving, benevolence, purity, patience, courage, contemplation, and knowledge. Of these, benevolence towards all nature is particularly binding. Buddha himself, in one of his transmigrations, offered himself, out of kindness, as food to a starving tigress. Humility, and other virtues commonly called Christian, are prescribed, not excluding the duties of confession and penance.

The perfect Nirwana is only attainable after death, but a kind of Nirwana may be obtained, which is a sort of ecstasy or trance, in which there are neither ideas nor their absence. It is difficult to see how this differs from a dreamless sleep, or from the unconsciousness which follows a stunning blow.

It naturally follows, from the nature of Buddhism, that there is little worship. In the temples are altars or shrines, and before these are offered flowers and fruits and incense, processions are made and hymns are sung; but these seem acts of commemoration, not of prayer, and are not wholly unlike the services prescribed by Positivism.

There are not wanting signs in present society of a hankering after the delights of esoteric Buddhism, but it is not universally admitted that its disciples are yet seated in the seat of intelligence.

Budgerigar, a dealers' corruption of the native name of *Melopsittacus undulatus*, a small Australian parrakeet, common in this country as a cage-bird. It is about the size of a sparrow, with green and yellow plumage, pencilled with black. Called also Undulated Grass Parrakeet.

Budget (literally *a small bag*), used metaphorically of a collection of items, as a budget of letters, or a budget of news. In England the term is specially applied to the annual financial statement of the Chancellor of the Exchequer, usually delivered in April, comprising an account of the receipts and expenditure for the past year, and estimates of both for the current year. In France and Italy it is applied to the annual estimates of the various departments of the Government for the expenses of the army, navy, etc.

Budweis, a town in the Austrian kingdom of Bohemia, at the junction of the Moldau and the Maltsch, and 133 miles from Vienna, is a well built city with some fine public buildings, including a 16th century cathedral with detached tower. There are considerable manufactures of pottery, blacklead, nails, sugar, and liqueurs; and in the mountains near the town are gold and silver mines. The first railway made in Germany—for horse traction—was from Budweis to Linz.

Buenos Ayres, the capital of the Argentine Republic, is on the right bank of the estuary of the river Plata, which, though 36 miles across at this spot and 150 miles from the open sea, is here so shallow that ships that draw 15 feet of water cannot approach within less than seven or eight miles from the town. The advantage that Buenos Ayres possesses over the rival Uruguayan port, Monte Video, upon the other side of the river, is that it has facilities for monopolising and controlling the inland trade which the latter city is destitute of. Late improvements in the water approach, with a system of river walls and of docks, which will on the one hand prevent floods and overflows, and upon the other will enable vessels of any size to come quite up to the city, together with the rapid development of railways that open up the resources of the country and will in time facilitate its communication with Chili, bid fair to give Buenos Ayres a future of great prosperity. The city is laid out in a square, and the streets intersect each other at right angles, but the roads are bad and muddy, and as the town is somewhat hilly, and the causeways are made level, these latter are often at an inconvenient height from the road, into which descent has to be made by slippery steps which bring the unwary pedestrian to grief. But he is perhaps compensated by the opportunity given him by the height of the causeways of studying the *dolce far niente* which is dear to the Argentine female nature. The best-built part of the town is the centre, in which most of the warehouses and houses of business are situated. The cathedral is exceeded only by that of Lima, and there are several fine public buildings, including the government house, the residence of the president of the republic, the University, the mint, the post office, a military college, and the congress hall, while some of the railway stations are imposing buildings. Six railways have their terminus here, and there are 100 lines of tram line, and there is cable communication with Europe and with the United States.

Of the dozen or so squares that the city contains the handsomest is the Plaza de la Victoria, which has in the centre a monument of the war of Independence. The city is well drained, and though till lately they depended upon the water carrier for a supply from the river, the water is now laid on, as well as gas, and the old arrangements remain only in the suburbs. Like most foreign towns of any pretension, the telephone is used extensively. There is a large foreign element in Buenos Ayres, many of the great houses of England, France, and Belgium having branches or representatives here, and the town is very cosmopolitan. The great majority of the foreigners are Italians, to which nation most of the café keepers belong; next in numbers are the Spanish, French, and English. There are newspapers in all these languages, and in German. As Buenos Ayres is on an alluvial plain, it presents a monotonous appearance, besides the practical disadvantages of being almost destitute of stone and of fuel. But as the people are ever ready to follow European fashions, granite is now imported for paving the streets, and the houses are built and furnished in European style, and are fitted with chimneys and grates, where European coal takes the place of charcoal and withered prairie weeds which were formerly burnt in the old Spanish *brazero*. The change is much appreciated, as the climate of Buenos Ayres is both humid and variable. It is a much debated question at the present time whether emigration to Buenos Ayres and its neighbourhood is a thing to be encouraged or not, some saying that the authorities hold out hopes to intending immigrants that are not realised, while others say that the disappointment is caused by the impossible ideas with which the emigrants arrive there, expecting to be at once well-to-do landed proprietors, without expenditure of capital or passing through the process of labour and hardship generally known as "roughing it." But emigration is easy, since there are numerous lines of steamers plying between Europe and Buenos Ayres.

Although the inhabitants of the city of Buenos Ayres resemble Europeans to a great extent in habits, you have only to go out upon the plain composing the province, among the cattle and sheep-rearing farms, or *estancias*, to find the wild, independent race of Gauchos, who live on horseback and employ their whole life chiefly in tending cattle, though on the many millions of acres of sheep-farms there is a large proportion of Scottish and Irish shepherds. The native owners of the cattle and sheep-farms divide their life between town and country, living a civilised life in the winter, and a semi-wild life upon their *estancias* in the summer. Compared with the industry of cattle-rearing, that of agriculture is not very important, and is confined chiefly to the eastern district of the province and to the south-west of the city. Buenos Ayres was founded by De Mendoza in 1535, and again in 1580 by De Garay, and in 1776 the province of Rio de la Plata was made a vice-royalty, with Buenos Ayres as capital. In 1805 and 1807 the English attacked Buenos Ayres and were driven off. In 1816 separation from Spain and the establishment of a republic was determined on, and since 1880 Buenos Ayres has been the seat of the federal government, the government of the province being carried on at La Plata. Pop. (1901), 836,391.

Buffalo, at the east end of Lake Erie, at the mouth of Buffalo river and at the head of Niagara river, is the capital of Erie county, in the state of New York, ranking third among the cities of New York, and the third city in the Union for its trade in live stock. But its great importance is as a centre of the corn trade, and it has a magnificent installation of elevators, while it has extensive iron and steel works, blast furnaces, rolling mills, machine shops, shipyards, tanneries, and breweries, and is a great coal depôt.

The city, which is about 290 miles direct from New York, and 539 miles from Chicago, has a frontage of about 5 miles to the lake and river, and has a large harbour, capable of accommodating vessels of 17 feet draught, with an outer breakwater of 4,000 feet, besides other extensive conveniences for trade and navigation. The formation of the Erie canal in 1825 gave the first great impetus to

the trade of Buffalo, a trade which has been greatly developed by the great extension of the railway system. The Grand Trunk Railway crosses the Niagara by a fine iron bridge at a short distance from the city. Buffalo is well paved, and is well provided with boulevards and avenues, and a fine park, and has many imposing buildings both public and private. The city was founded by the Holland Land Company in 1801. After being burnt in 1813 by the English, it was rebuilt, and from a population of 15,000 in 1832 had risen to 376,587 in 1905.

Buffalo, any individual or species of Bubalus, a genus or sub-genus of Bovidæ, strictly confined to the Old World, though in America the name Buffalo is commonly given to the Bison (q.v.). Buffaloes are large, clumsy oxen, differing from the domestic ox in their massive proportions, and in having the horns flattened and triangular in section, inclined outwards and backwards, and turning upwards at the tips. The Asiatic or Indian Buffalo (*B. buffelus*), a native of India and the islands of the Eastern

BUFFALO.

Archipelago, stands about four feet high at the shoulders, and is some seven feet from the snout to the insertion of the tail. The skin is brown, and sparsely covered with stiff black hair, longer on the head and neck, and falling off with age. The horns curve backwards, and when the animal is in motion it holds its head so far forward that they touch the shoulders. The hide makes excellent leather; from the milk a kind of butter is made; but the flesh is little esteemed. The buffalo was domesticated at a very early period; from its great strength it is a valuable beast of burden, and has been introduced into Egypt and the South of Europe. Both in its wild and tame condition it is a marsh-loving animal, and rolls in and coats itself with mud as a protection against insects. It can never resist the temptation of wallowing, and for this reason is seldom laden with goods liable to damage from water. It is said to be a match for the tiger, and fights between these two animals are a common amusement of some of the native princes. The name "sporting buffaloes" is given to those trained to stand as cover for sportsmen shooting waterfowl. The Cape buffalo or Cape ox (*Bos caffer*), a native of South Africa, is a somewhat larger animal, covered with deep brown or black bristly hair, and having huge horns flattened at the base, where they almost meet. It resembles the Asiatic species in general habits, but is of much fiercer disposition. Large herds of these animals were formerly very common, but the advance of civilisation and the fondness of sportsmen for "large game" have rendered the Cape buffalo rare, if not extinct, within the colony from which it takes its name. This animal has never been domesticated; but this is probably rather due to the low condition of the natives than to the inherent difficulty of the task. [ANOA, ZAMOUSE.]

Buff Leather, a strong oil-dressed leather, made from buffalo's or some kind of ox's hide. It was formerly used as armour, but is now principally employed in the making of pouches, belts, etc.

Buffon, GEORGE LOUIS LECLERC, COMTE DE BUFFON, who did more perhaps than any other one man to popularise the study of zoology in the 18th century, was born at Montbard, Burgundy, in 1707. He studied law under the Jesuits at Dijon, and showed great taste for mathematics, and patience in investigation. In company with Lord Kingston he travelled in Italy and studied at Angers. He translated Newton's *Fluxions* and Hales' *Vegetable Statics* into French, and, being possessed of considerable private means, employed an amanuensis in his study of mathematics, physics, and agriculture. In 1739 he was chosen a member of the Academy of Sciences and keeper of the Jardin du Roi and Museum, so that Paris became his home, and there he died in 1788. Though having himself but a slight knowledge of anatomy and neither knowledge of nor liking for system, the scheme of his great descriptive *Histoire Naturelle*, which was at first published in forty-four quarto volumes, was more comprehensive than any that had preceded it. The first three volumes were published in 1749, and in the first fifteen Buffon had the assistance of Daubenton, a profound anatomist, whilst the last eight volumes, dealing with reptiles, fish, and cetacea, were published by Lacépède, after the death of their projector. Buffon's bold speculations as to the gradual cooling of the planetary system and the adaptation of our earth as it cooled to successive groups of organisms give him a permanent place in the history of biology.

Buff-tip, a well-known English moth (*Pygæra bucephala*), in which a buff patch occurs at the tip of each upper wing; when at rest the moth is protected by its resemblance to a piece of dead wood. The caterpillar lives on trees, and the pupa is not protected in a cocoon.

Bug. 1. The Western Bug rises in Austrian Galicia, and forming in a great measure the eastern boundary of Poland, falls into the Vistula near Warsaw, after a course of 470 miles. 2. The Eastern Bug,

rising in Podolia, flows south-east into the estuary of the Dnieper after a course of 520 miles.

Bugeaud, THOMAS (1784–1849), a French soldier, born at Limoges. He entered the army at nineteen years of age, and showed such bravery and talent that he obtained his colonelcy in 1814. The revolution of 1830 recalled him to public life, and he became deputy for Perigueux, and was sent to Algeria in 1836. He distinguished himself in the war against Abd-el-Kader, and was appointed Governor of Algeria in 1840, and made Marshal of France in 1843, and the next year he received the title of Duc d'Isly for a victory over the forces of the Emperor of Morocco. He commanded the army in Paris during the revolution of 1848, and died of cholera the year after.

Bugenhagen, JOHANN (1485–1558), a German scholar and reformer, was born at Wollin in Pomerania, whence he is sometimes surnamed "Pomeranus." He was distinguished as a classical scholar at Greifswald, where he was educated, and early in the 16th century became rector of a school at Treptow, and was appointed by a neighbouring convent to lecture to the monks. Converted to the views of Luther by the latter's book *De Captivitate Babylonicâ*, he quickly converted the abbot and others, and threw himself heart and soul into the work of the Reformation. His energy and his talent for organising were great, and he was chosen to regulate the affairs of the new churches generally, and in 1537 he was invited to Denmark by Christian III. to organise the church and schools; and there he remained five years, and returned to pass the rest of his life at Wittenberg. Besides aiding Luther to translate the Bible, he wrote many works, among them being an interpretation of the Psalms and a *History of Pomerania* which was first published in 1728.

Buggy, a light four-wheeled vehicle with a hood; this is the use of the word in the United States. In India it signifies a gig with a hood, and in England a two-wheeled carriage without a hood.

Bughis (properly WUGI), a people of central and south Celebes, one of the most intelligent and enterprising in the Malay archipelago; speech a Malayo-Polynesian dialect written in a peculiar character of Hindu origin, and possessing a literature (chronicles, legends, poetry); type Indonesian, light complexion, straight eyes, prominent nose, regular (Caucasio) features. [INDONESIANS.] The Bughis are great traders and navigators, maintaining active commercial relations with every part of the Archipelago, from Sumatra to the Aru Islands. All have been Mohammedans since the beginning of the seventeenth century.

Bugle, a musical instrument, generally made of brass or copper, with a tube rather shorter and less expanded than that of the trumpet (q.v.), and played with a cupped mouth-piece. It is used in the army as a signalling instrument; it formerly was employed only for infantry, the trumpet being used for cavalry and artillery, but now it has quite superseded the latter in all regiments.

Bugs, a group of insects belonging to the order Rhynchota, and constituting the sub-order HETEROPTERA. They are insects with jaws adapted for piercing, and provided with a suctorial proboscis or rostrum: they have four wings, and the name of the sub-order is derived from the fact that those of the anterior pair are half-horny and half membranous (*hemielytra*, and hence sometimes known as the *Hemiptera*). Some bugs, however, are wingless. The majority live on plants, but others, including most of the aquatic species, live on other insects, or suck the blood of birds or mammals. The first segment of the body (prothorax) is large and movable in nearly all the forms, and by scraping this against the neck a slight but shrill note is produced: this is especially noticeable in *Pirates stridulus*, a species common under stones, etc., in the South of France. The bugs are divided into two groups—the Land Bugs or Geocores, and the Water Bugs or Hydrocores; in the former the antennæ and the rostrum or sucking tube are both longer than in the latter division. The best known species is the Bed Bug (*Cimex* or *Acanthia lectularius*, Linn. sp.), which is probably indigenous to Africa, whence it has been carried over the world. It was recorded in England in 1503, but does not appear to have established itself till late in the seventeenth century, when it is said to have been largely introduced in the timber used for rebuilding London after the Fire. It is mainly kept in check by the cockroach. Some of the bugs are of some size; thus some of the species of *Belostoma* measure six inches in expanse of wing; the Wheel Bug (*Reduvius personatus*, Linn. sp.) is one of the largest English species. A few genera, such as *Phyllomorpha*, resemble the leaves of plants in appearance. The species of one genus, *Halobates*, live on the surface of the sea, far from land. The earliest species occur in the Lias (q.v.).

Bugulma, a town of European Russia, 243 miles from the city of Samara, to the government of which it belongs, and on the Bugulminka, a tributary of the Kama, which flows into the Volga. It is quite a modern town, and is only important as being at the junction of two great roads from Orenburg and Ufa.

Buguruslau, a town of European Russia, government Samara, is situated at the confluence of the Kimel and Tarkhanka.

Buhl, ANDRÉ, an Italian cabinet maker born in 1642. He lived in France, and there invented the work which bears his name. It consists of dark-coloured tortoiseshell or wood, inlaid with brass. He died in 1732.

Building Societies are institutions which have sprung into existence in comparatively recent times, and although originally designed more particularly for the working classes, they have attained a very considerable position, not only as a profitable investment for savings for all classes of the community, but as a means of acquiring, by borrowing on favourable terms, freehold, leasehold, or copyhold properties.

Their principal object is to raise a fund, out of

which the members can purchase properties of the above description by advances made to them out of the society's funds, such advances being repayable (both principal and interest) by fixed periodical instalments.

It is difficult to state accurately the precise origin of these societies, but institutions of a somewhat similar character are believed to have existed in a rude form amongst the Greeks in the days of the republics; amongst the Anglo-Saxons in Great Britain, and also in the South Sea Islands. Associations to enable their members to build or purchase dwelling houses were known in Birmingham as far back as the year 1781. In January, 1809, the "Greenwich Building Society" was formed under certain rules and regulations, the object being to raise a fund, by the monthly subscriptions of its members, which was to be laid out in building houses, and the dividing of the same among the subscribers under and subject to such rules.

These societies were formerly founded and regulated in this country under the old Friendly Societies' Acts, the principal one being the 6 and 7 William IV., c. 32; but their increasing popularity and importance induced the Legislature in the year 1874 to pass a special Act of Parliament for their regulation, by which many important privileges (hereafter more particularly mentioned) are conferred on building societies.

The existing Building Society Acts are the 37 and 38 Victoria, c. 42 (the one above referred to as passed in the year 1874, and known as the *Building Societies Act* 1874), and the Acts 40 and 41 Victoria, c. 63, and 47 and 48 Victoria, c. 41, known as the "Amending Acts." The first named is the principal Act, and under it societies are formed, and on their rules being duly registered as required by the Act, and certified by the Registrar, they possess a corporate character, and enjoy the protection of limited liability; shares can be transferred without payment of stamp duty, and reconveyances of the mortgaged property by deed are rendered unnecessary, a simple receipt for the mortgage money endorsed on the mortgage deed answering the purpose of a reconveyance. Building societies so constituted have also power, if authorised by their rules, to borrow money within certain defined limits.

Building Societies are either permanent or terminating.

A Permanent Society, as the name implies, may last for ever, investing shares being issued, upon which payments are made by the several members either in one or several sums, upon which interest accumulates, or else it is paid out to the member at his election. Advances are made to borrowers (either members of the society or strangers), repayable by periodical instalments, including principal and interest.

A Terminating Society, on the other hand, is one which by its rules is to terminate at a fixed period, or when a certain result has been attained. Upon each share a fixed subscription is payable throughout the Society's existence; this forms a fund adequate to give every member a sum fixed by the rules at its foundation. In some societies the advances are made by ballot, in others by sale; in others again by alternate ballot and sale. There are a number of societies throughout the country of this character known as "Starr Bowkett societies," the name being adopted from a Mr. Starr, who was largely instrumental in forming them in the first instance.

The "Industrial and Provident Societies Act 1876," repealing the Acts of 1862 and 1871, enables societies to be formed for the purpose of buying and selling land, with power to mortgage, lease, or build. These are known as Co-operative Building Societies.

Freehold Land Societies also in form come under the "Building Societies Acts." Subscriptions are received in these societies in the same way as in building societies, and out of the funds so subscribed estates in land are purchased, which are afterwards split into lots suitable to the member's requirements, and other improvements are effected, the cost of which and of the original conveyance to the society is distributed over the whole property, and added to the purchase money of each lot. Members of these societies are thus enabled to acquire small pieces of land at wholesale price. A building society cannot in law legally hold land except by way of security; *therefore*, the arrangements above described respecting freehold land societies have to be carried out through the medium of trustees.

As regards disputes from time to time arising in these societies on the construction of their rules or otherwise, a convenient and economical mode of adjusting them is provided by the Act, viz. arbitration.

Dissolution of these societies, whether permanent or terminating, may take place on the occurrence of any event declared by the rules to have that effect; or they may be dissolved in any manner prescribed by their rules, or by the Act, or they may be wound up, either voluntarily or compulsorily, under the Companies Acts 1862–1867.

Building societies exist in Scotland, and also in the United States. In the latter country there are many thousands established. The funds are lent to borrowing members, who pay a premium for that privilege in addition to interest. Fines are also exacted for non-payment of subscriptions, as is the case generally and everywhere in both classes of societies.

A Royal Commission having been appointed in the year 1871 to inquire into the operations of building societies, the principal Act of 1874 (above referred to) may be considered as the outcome of their report made to Parliament. Periodical returns and reports have to be sent by each society to the Registrar annually. It is supposed that half a million of persons are directly or indirectly interested in building societies.

Buitenzorg (*without care*), capital of the province of the same name in Java, is a favourite holiday resort for the merchants of Batavia, from which it is about 40 miles south. It has also one of the finest botanic gardens in the world.

Bukkur, a fortified island of Sind, in the Indus.

is situated between the towns of Roree, on the E., and Sukkur on the W. bank. It is only 800 yards long by 300 yards broad.

Bukowina (*i.e. beech-land*), a duchy of the Austrian empire, is bounded on the N. and N.W. by Galicia, E. by Russia and Roumania, S. by Moldavia, and W. by Hungary and Transylvania. It covers an area of over 4,000 square miles, largely occupied by woodland, traversed, especially in the S., by offshoots of the Carpathians, and is drained mainly by the Danube and the Pruth. It gives to the Emperor of Austria the title Duke of Bukowina, and was ceded to that country in 1775 by Turkey. The capital is Czernowitz. Its products are chiefly agricultural, including the rearing of horses and cattle.

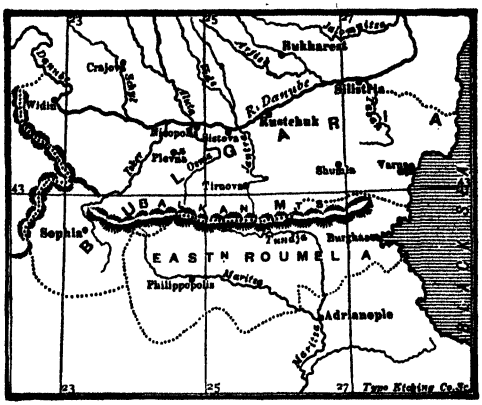
Bulacan, a town on Luzon, one of the Philippines, and capital of a province of the same name, is situated on the river Bulacan, at the head of the bay of Manila, and 20 miles from that town.

Bulandshahr, a district of British India, in the North-Western Provinces, covers an area of nearly 2,000 square miles. It comprises an alluvial plain, enclosed between its principal rivers—the Ganges and Jumna. It is traversed by the East India and the Oudh and Rohilkhund railways, and has been made fertile by artificial irrigation. Besides the ordinary grains, cotton, indigo, and sugar are among its leading products. Its chief town and the administrative headquarters of the district bears the same name.

Bulb, a short, fleshy, and generally conical underground stem, giving off adventitious roots from its under surface, and covered above with leaf-scales. Bulbs are of two classes: *squamose*, with imbricate scales of small relative width, as in *Lilium*; and *tunicate*, with concentrically sheathing scales, as in the onion. Bulbs vary in duration, being either annual, biennial, or perennial, and reproduce themselves, sometimes multiplying rapidly, by the production of "cloves," or axillary buds in the axils of their scales, which become independent. Bulbs are especially characteristic of dry climates, such as Asia Minor and South Africa, and of monocotyledons, especially the *Liliaceæ* and *Amaryllidaceæ*. A swollen aërial branch in epiphytic orchids (q.v.) is termed a *pseudo-bulb*, but is less closely homologous to a bulb than the aërial *bulbil*, or undeveloped branch with a few over-lapping leaf-scales, which falls off and reproduces the plant, in the tiger-lily. Enlarged roots, such as those of the turnip, are sometimes erroneously called bulbs by farmers.

Bulbul, the Turkish and Persian name for the nightingale (in which sense it is common in poetry), used in zoology as the English name of a family (Pycnonotidæ) or sub-family (Brachypodinæ) of Oriental birds, intermediate between the Babblers and Thrushes, and sometimes called Fruit-thrushes. Some of the species of the type-genus Pycnonotus are kept in England as cage-birds, and in India *P. hæmorrhous* is trained to fight like a game-cock.

Bulgaria, a kingdom, was a principality until 1908 under the suzerainty of the Sultan of Turkey. It is situated on the right or southern bank of the Danube, and extends from the influx of the river Timok to Silistria, and thence to the Black Sea. Bulgaria was originally bounded on the S. by the Balkans, and on the W. by Servia. Since 1886 its boundaries have been enlarged by the union with Eastern Roumelia, on the S. side of that range, which now forms part of the king-



BULGARIA.

dom, and is often called Southern Bulgaria. The total area is 38,390 square miles. Bulgaria is an extensive table-land, sloping to the Danube, and drained by its tributaries, which are numerous, but of inconsiderable size, and by a few small streams running into the Black Sea. The only *mountains* are the Balkans (the *Hæmus* of the ancients), of an average height of 5,000 feet, Mount Scardus, the highest peak of the Char Dagh, has an elevation of 9,700 feet above the sea. The mountains are of granitic character, and can be traversed only by certain passes. That known as Trajan's Gate carries the main road between Constantinople and Vienna; the Shipka Pass is memorable as the scene of a gallant struggle during the Russo-Turkish war.

Climate. The winter is severe but not long, the summer and autumn generally warm and dry but for occasional thunderstorms. The soil is a light black or brown loam, very fertile.

Minerals abound. Coal, silver, lead, iron, chrome, manganese, graphite, malachite, gypsum, kaolin, and salt have all been found, but there are very few mines at work. Iron and sulphur springs are numerous.

History. Bulgaria proper includes most of the ancient Mœsia, which, when first mentioned by historians, had a Slav population. Various Gothic colonies were afterwards founded, and about the middle of the sixth century the Bulgarians, a Finn tribe from the banks of the Volga, settled in Lower Mœsia. In the seventh century Upper Mœsia was given by Heraclius, the Byzantine emperor, to the Serbs, a Slavonic race. [SERVIA.] Bulgaria,

as Lower Mœsia now came to be called, after remaining for some centuries under the protection of the Byzantine empire, in 1185 declared its independence. The yoke of the empire, however, was merely exchanged for that of Hungary, until the year 1392, when the country was conquered by the Ottomans, and its so-called independence came to an end. The troubles culminated in 1876-8 in the Russo-Turkish War [TURKEY], from which Bulgaria rose a separate State under Prince Alexander. Prince Ferdinand was elected in 1887, and became Czar in 1908.

Constitution. The principality was created in 1878 by the Treaty of Berlin, which ordered that it should be autonomous, and tributary to the Sultan, with a Christian government and a national militia, and the Prince should be freely elected by the population and confirmed by the Sublime Porte. In October, 1908, however, Bulgaria declared her independence, and the Prince became Czar of Bulgaria. Eastern Roumelia was handed over to the Prince of Bulgaria by imperial firman, April 6th, 1886. Sofia forms the joint capital.

The legislative authority was originally vested in a single chamber called the National Assembly. This is elected for five years (by "manhood suffrage") in the proportion of one member to every 20,000 of the population. In 1883 the Assembly assented to the creation of a second chamber. The executive power is wielded by a council of eight ministers, those, namely, of (1) Foreign Affairs and Public Worship, (2) the Interior, (3) Public Instruction, (4) Finance, (5) Justice, (6) War, (7) Commerce and Agriculture, (8) Public Works, Ways and Communications. Bulgaria is divided into twelve districts.

Population, in 1905: total, 4,028,239. About three-fourths of these are Bulgarians, the remainder being made up of Mussulmans (who are annually decreasing), Greeks, Jews, gipsies, and foreigners of various nationalities.

Education. The constitution makes primary education free and compulsory. In the agricultural districts a large proportion of the children are kept away from school to help in farm labour. There are 4,581 elementary schools, with 8,771 teachers; there were in 1907 20 gymnasia, with 12,318 pupils; 199 lower middle-class schools, with 11,772 pupils; while 409,308 pupils (148,371 girls) attended the elementary schools. The State grants a yearly subvention for education which provides for half the cost, the remainder being provided in towns by the municipalities and in villages by the communal authorities.

Sofia has a university, maintained by the government, which also supports higher schools at about a dozen other towns. There is an excellent free library at Sofia.

Agriculture. Though almost exclusively an agricultural people, the Bulgarians are in many respects a long way behind the food producers of other European countries. There are no large landowners, and the cultivated lands, which comprise nearly 6,000,000 acres, or about 25 per cent. of the total area, are chiefly in the hands of peasant proprietors, having freeholds averaging less than 20 acres in extent. These small farmers maintain a strongly conservative attitude with regard to scientific improvements. Modern machinery, chemical manures, and even the rotation of crops, are practically unknown, and the primitive methods of the classical period still prevail.

A more serious difficulty even than this lack of enterprise among the farmers is the want of adequate means of communication and transport. The roads, although somewhat improved during the last few years, are still among the worst in Europe. The railways, few and not easily accessible from the villages, charge prohibitory freight rates.

Grain, principally wheat, of which 240,375 tons were exported in 1907, is the chief product. Grain constitutes about 80 per cent. of the total exports. Wine, silk, tobacco, rice, and cotton are also produced, but in no great quantities, and flax, hemp, poppies, madder, and colza are cultivated. Cotton-growing is being tried. There are 728,000 acres of forest and woods containing oak, beech, elm, ash, pine, poplar, cornel, and juniper. New laws have recently been passed for their protection from waste.

The famous attar of roses is produced chiefly in the prefectures of Philippopolis and Eski Zara, in which latter is situated the Kezanlik "Valley of Roses." The output of attar is about 6,000 lbs. annually, the value being from £12 to £14 per lb. The rose-growers are mostly of the poorer class, and derive but little benefit from the business, the crop being bought up, often in advance, by wealthy merchants, who make enormous profits.

Cattle-breeding is carried on with little or no attempt to improve the quality of the stock produced. Oxen and buffaloes are used for draught, almost to the exclusion of horses, which are scarcely employed outside the towns, where they are worked in strings as pack-horses. Of late, efforts have been made by the government to introduce stallions and bulls of a better class, for stud purposes. In 1905 there were 8,081,816 sheep, 1,370,201 goats, and 463,241 pigs in Bulgaria. The annual export is quite unimportant.

Industries. These are practically non-existent. A few inefficiently worked coal mines, and some manufactories of rough homespuns (gaïtan) and braid embroidery (abu and shayak), are alone worthy of mention.

Army. Service is compulsory. There are thirty-six regiments of infantry, each of two battalions and a depôt, nine regiments of cavalry, nine regiments of artillery, and half a battalion of field engineers (besides units of howitzer, mountain, and fortress artillery, railway and other engineers). Total peace strength, about 54,000 of all ranks; total war strength, about 375,000.

Navy. This includes a few steam sloops, armed with guns, and some torpedo boats. In 1905 a Department of Marine was instituted and an admiral appointed.

Bulgarin, THADDÄUS, writer, was born in 1789, in Minsk. After serving in the Russian army, he in 1810 joined the Poles under Napoleon, taking part in campaigns in Spain, Germany, and Russia.

In 1819 he settled in St. Petersburg, edited the *Northern Archives*, *The Northern Bee*, and *The Russian Thalia*, and in 1829 published *Ivan Vinzhagen*, his first novel, which heightened his popularity. Besides novels he also wrote histories, travels, and reminiscences. He died in 1859.

Bull. 1. An authoritative letter to the Catholic Church, issued by the Pope as its head, and so-called from the *bulla* or round leaden seal which gives it validity. This bears on one side the figures of St. Peter and St. Paul; on the other, the name of the reigning Pope. It is attached to the document by a cord (silken if the bull is "a bull of grace," hempen if it is a "bull of justice"). The bull is in Latin, and is engrossed on parchment in a peculiar character, and is dated "from the day of the Incarnation," and sometimes in the classical Roman fashion (so many days before the calends, nones, or ides of the month). Important doctrines have often been promulgated thus, and the bull is often known by some of the Latin words near its opening. The BRIEF is a somewhat similar letter of a less important and authoritative character. The term bull has occasionally been applied to documents issued by lay princes.

2. A ludicrous blunder in expression, involving some inconsistency, of which the speaker himself is unconscious. Sir Boyle Roche's saying, "No man can be in two places at once unless he is a bird," is an instance. Though "bulls" are now supposed to be an Irish characteristic, the word (according to Dr. Murray) was long in use before it was specially connected with the Irish. The theory that the use of the term originated in contemptuous allusion to the Papal edicts is rejected by the same authority, who connects it with the old French word *boul*, fraud. Thus it may have meant originally a jest or practical joke.

Bull, GEORGE, Bishop of St. David's, was born in 1634 at Wells, Somersetshire. Refusing while at Oxford to take the oath of allegiance to the Commonwealth, he was obliged to leave, and was ordained privately when he was only twenty-one. In 1658 he was appointed Rector of Suddington near Cirencester; in 1685, of Avening, Stroud; in 1686, Archdeacon of Llandaff; and in 1705, Bishop of St. David's. He wrote several religious books; among them *Harmonia Apostolica*, awakening considerable controversy; the *Defensio Fidei Nicenæ*, his greatest work, showing that the doctrine of the Trinity was an article of faith in the Christian Church previous to the Council of Nicæa; and the *Judicium Ecclesiæ Catholicæ*, which gained for him the thanks of the French clergy.

Bull, JOHN, the name given to the English nation personified, is taken from Arbuthnot's satire, *The History of John Bull*, meant to ridicule the Duke of Marlborough. In it John Bull's mother is the Church of England, and his sister "Peg" is Scotland. The French in the same book are personified as *Lewis Baboon*, and the Dutch as *Nicholas Frog*.

Bull, JOHN, musician and composer, was born in 1563, in Somersetshire. In 1591 he was appointed organist in the Queen's chapel in succession to Blitheman, his master; in 1596 received the degree of doctor of music at Cambridge; in 1596 became music lecturer at Gresham college; and in 1597 organist to James I. He became in 1617 organist to the cathedral of Notre Dame at Antwerp, where he died in 1628. He is one of the many on whose behalf claims to the authorship of *God Save the King* have been advanced.

Bull, OLE BORNEMANN, violinist, was born in 1810 at Bergen, Norway. Becoming acquainted with Paganini, whose style of play his own subsequently resembled, he received the impetus to cultivate excellence in the violin. His wonderful play made him the recipient of enthusiastic receptions in Europe and America, which latter continent he visited three times. He died near his birthplace in 1880.

Bullace (*Prunus insititia*), a wild variety of *P. communis*, differing from the blackthorn (q.v.) in having brown bark instead of black, straighter, and less spinous branches, larger leaves which are downy on their under-surfaces, downy flower-stalks and larger flowers and fruit, whilst the latter, though round, is less harsh to the taste. A variety with yellow drupes is sold in London as "white damsons," and though most plums (*P. domestica*) are altogether free from spines and have oval fruit, there are, in fact, no constant characters to distinguish *P. insititia* from *P. domestica*.

Bulla, a swelling of considerable size produced by an accumulation of serous fluid beneath the epidermis; a vesicle (q.v.) on a large scale. [PEMPHIGUS.]

Bulldog, a breed of dogs said to be derived from the same stock as the mastiff (q.v.), formerly used by butchers for catching and throwing cattle, and afterwards bred for bull-baiting (q.v.). These dogs are large, powerful animals, of greater courage than intelligence, loving and obedient to those they know, slow to make friends, and swift to resent injury to themselves or their masters. The following are the chief points of the breed as laid down by Vero Shaw:—Skull large, square and broad; skin of forehead wrinkled, the "stop" or indentation between the eyes deep; lower jaw projecting beyond the upper; canine teeth wide apart, incisors regular; eyes large; nose set well back, allowing the dog to breathe freely while holding on; ears small; cheek-bumps at base of jaw well developed; neck muscular, and with a double dewlap; shoulders sloping and strong; chest wide and deep; forelegs powerful, straight, shorter than the hind, and turned out at the shoulders; body very deep at the chest, of considerable girth; back short, rising from the shoulders to the loins, then sloping to the stern, forming a "roach" or "wheel" back; loins powerful; tail set on low, short, and very fine; hind legs turned out behind; coat short and close; weight about 50 lbs. for a dog, and 45 lbs. for a bitch. Bull-dogs may be of any colour, except black or black-and-tan; brindle-and-white, brindle, white, fallow or fawn with black nose being the most valued.

Buller, CHARLES, politician, was born in 1806 in Calcutta. Educated at Harrow and Cambridge, and was for some time under the tuition of Thomas Carlyle. In 1830 he was returned to Parliament for West Looe, and, after the passing of the Reform Bill, for Liskeard. In 1838 he went with Lord Durham to Canada as chief secretary; in 1841 became secretary to the Board of Control; in 1846 judge advocate-general, and in 1847 chief poor-law commissioner. He died in 1848.

Buller, SIR REDVERS, was born in 1839. He served in campaigns in China, Ashanti, South Africa, Egypt and the Soudan, and was for a short time Under-Secretary for Ireland. During the Transvaal War in 1899, he was appointed to the chief command, but after his reverse at the Tugela River, Lord Roberts was made commander of the British forces in his stead, Sir Redvers Buller remaining general of the forces in Natal. He effected the relief of Ladysmith in the face of great difficulties, and afterwards joined forces with and rendered valuable assistance to Lord Roberts. He returned to England in November, 1900. In October, 1901, he was given command of the First Army Corps at Aldershot, but was retired on half-pay three weeks later in consequence of a speech made in London, defending himself against attacks made upon him in the Press. He died in 1908.

Bullfight, the national sport of Spain and Mexico, is an elaborate form of the combats with bulls which were an occasional feature of the ancient contests in the amphitheatres of classical times. The bull is first attacked by *picadores*, or pikemen, dressed in antique knightly costume and mounted on worthless horses fit only for the knackers, which are blindfolded; they do their best to excite the bull to charge them. A furious bull will often gore, and even disembowel, their horses, which are nevertheless urged again and again to the charge so long as it is possible for them to move. Should the *picador* be endangered, either another *picador* will draw off the attention of the bull, or men on foot will create a diversion by taking the bull in flank, showing him scarlet cloaks, throwing darts with explosive fireworks attached, which stick in his hide, and by other methods. After the *picadores* retire, the bull is worried by men on foot, *chulos* and *banderilleros*, who irritate him with scarlet cloaks, and darts sometimes with fireworks attached, vault over him with poles, and exasperate him in other ways, saving themselves, of course, by their agility. Finally the *matador* enters on foot with a naked sword and a small red flag, which again infuriates the bull. He rushes on the *matador*, who stabs him; he falls dead, and his carcase is dragged off the stage by a team of mules. From six to ten bulls are killed in an afternoon. Some, of course, will not show fight, and are dispatched ignominiously by the *picadores*. The danger to the performers is, of course, considerable, to the *matador* especially; hence a successful *matador*, though usually taken from the lowest of the population, is a popular hero, whose company is sought in certain aristocratic circles, and who, being paid from £50 to £100 per bull slain, often makes a large fortune—in one case, it is said, £40,000 sterling. The annual cost of the sport to the nation is estimated at £1,200,000. About 2,400 bulls and 3,600 horses are annually killed. Attempts have been made to naturalise the bullfight in the South of France, and even in Paris; but the bulls have usually their horns tipped or blunted, so that the more disgusting features of the Spanish sport are absent.

Bullfinch (*Pyrrhula europæa*), a well-known finch (q.v.), widely distributed over Great Britain and common in some parts of Europe, but scarce in Ireland. The male is rather more than six inches long, ashy grey on the back, crown, tail, and long wing-feathers black, white bar on wings. The female is rather smaller, and has the back brownish grey, the under surface bluish grey, and the rest of the plumage less brilliant than in the male. Black, albino, and pied varieties often occur. The bullfinch frequents copses and plantations, and is an unwelcome visitor to orchards and gardens, for it has a bad reputation for destroying the buds of fruit trees though against the undoubted harm it does in this way should be set its destruction of the seeds of countless docks, thistles, and plantains. The nest is a rude structure of twigs, lined with root-fibres, and generally containing four bluish-white eggs, speckled with orange-brown. There are usually two broods in the year. The natural song is soft and simple, but so low as to be almost inaudible. The call is a plaintive whistle, and while feeding the bird utters a feeble twitter. The popularity of the bullfinch as a cage-bird is due to the fact that it can be taught to whistle a simple air—in some cases two or three—and to its capacity for attachment to its owner. Bullfinches are, for the most part, trained in Germany, and the work of teaching them begins early and must be continued till after the first moult, for at this period they often forget, or repeat in a confused fashion, what they have previously learnt. *P. major*, a larger form, occurs in the north and east of Europe.

Bullfly [GADFLY.]

Bullfrog (*Rana mugiens*), a large frog, measuring from 13 inches to 21 inches over the extended limbs, ranging over the United States and as far north as Quebec. The body is green in front, dusky olive behind, and marked with irregular black blotches; limbs dusky, barred with black; under parts yellowish. The popular and specific names refer to the loud croak of this animal, which can be heard at a considerable distance. Bullfrogs are solitary, except at the breeding season, when they assemble in large numbers, and their call is then louder than usual. The hind legs of these frogs are excellent eating. The name Bullfrog is sometimes (as in Byron's *Corinth*) applied to other species with a loud note.

Bullhead, any individual of the acanthopterygian genus *Cottus*, which consists of some forty species of shore and freshwater fishes from the north temperate zone. They frequent rocky ground, lying between stones, and darting out with rapidity on their prey—small aquatic animals,

notably crustacea. The River Bullhead (*Cottus gobio*), found in some British rivers, is from 3 inches to 4 inches long; brown, with dark spots on the upper part, and white beneath; but it undergoes many changes of colour after exertion or feeding. The flesh, when boiled, is salmon-coloured, and delicate-eating. [FATHER LASHER; for the ARMED BULLHEAD *see* POGGE.] The species are also called Miller's Thumbs, from their broad flat heads.

Bullinger, HEINRICH, reformer, was born in 1504 at Bremgarten, near Zurich. After studying at Emmerich and Cologne, where he became acquainted with Luther's writings, he became intimate with Zwingli, whom he accompanied in 1528 to the religious conference at Berne. In 1529 he was made pastor at Bremgarten, and two years later succeeded Zwingli in the principal church at Zurich. Of his numerous writings many were translated into English, and amongst his correspondence were letters from Lady Jane Grey. He died in 1575 at Zurich.

Bullion (perhaps from French *bouillir*, to boil) thus, molten metal, gold or silver in the mass, as distinguished from coin, plate or jewellery; sometimes used loosely to include coin considered solely with reference to its value as metal. For statistics of the production of bullion *see* GOLD, SILVER.

Bullroarer, a boy's toy, consisting of a thin kite- or fish-shaped piece of wood, tied to a long string and whirled round, so as to produce a roaring noise. Mr. Andrew Lang applies the name to the turndun (q.v.).

Bull Run, a river of America in the N.E. part of Virginia, forms the boundary between the counties of Fairfax and Prince William. It gives its name to two battles fought during the Civil war. The Union army was defeated each time. The first was fought July 21st, 1861; and the second August 29th and 30th, 1862.

Bulrush, properly the English name of *Scirpus lacustris*, one of the sedges which is used throughout Europe for rush-bottomed chairs and mats. The name is now generally transferred to the reed-mace or cat's-tail (*Typha latifolia* and *T. angustifolia*), very different plants, the brown velvety truncheon-like heads of female flowers of which, surmounted by the more slender and perishable spike of male ones, render them favourite decorations in London drawing-rooms.

Bulls and Bears. On the London Stock Exchange the "bull" was originally a speculative purchaser of stock for future delivery, in the hope that it would rise, while the speculative seller, whose interest it was that the stock should fall, was called bear. The latter term was apparently earlier, and suggested by a proverb about "selling the bearskin before you have the bear" (since the speculative seller sells what he does not yet possess). "Bull" in this sense may have been suggested by "bear." Possibly as it is the bull's object to make the stock go up, some fancied resemblance between his asseverations of its excellence and the bellowings of a bull may have suggested the term. [BOOM.] The terms are no used to denote anyone who tries to produce rise or a fall respectively in certain stocks. Thu to "bear Argentine stocks" may mean to try t lower the public estimate of their value.

Bull-terrier, any dog of the breed obtaine by crossing the bull-dog and the terrier, and con bining the good points of both the original form The colour should be pure white; body muscula head long and pointed, ears erect, general clipped.

Bull Trout, a loose name for several speci of trout (q.v.). Among a number of so-called bul trout Dr. Günther found young salmon, salmo trout, and the sewin or grey trout; and it is to th last-named form, probably only a variety of th salmon trout, that the name should be confine This fish reaches a length of about 3 ft., and found in Wales, Cornwall, Dorset, Cumberland, th north of Ireland, and on the Continent. The youn lose the parr-marks early, and are then silvery wit a greenish tinge; in older fish the back is greenisl brown, in the spawning season the belly becom dark-brown in the male, but the silvery ting persists in the female. The gill-cover is square, an is proportionately larger than in the salmon (q.v. as are also the teeth; and the flesh is paler and less delicate flavour. The tail is convex owing the growth of the central rays. The name sometimes given to *Salmo hucho*, a large cha (q.v.) from the Danube.

Bülow, FRIEDRICH WILHELM VON, genera was born in 1755 at Falkenberg. Entering th Prussian army at the age of 14, he was engage in the revolutionary war with France from the begi ning. On the renewal of hostilities in 1813 he was command at the battle of Möckem, the fir successful encounter with the French. He defeate Oudinot at Luckau and Grossbeeren, and Ney Dennewitz. For these and other signal services was raised to the rank of general, awarded a estate, and given the title Count of Dennewitz. 1815 he headed the column in Blücher's army th first came to Wellington's aid at Waterloo. H died in 1816 at Königsberg.

Bulsar, a town and port of British India, in th district of Surat, is situated at the mouth of th river of the same name. Its trade is considerabl and it has cotton manufactures.

Bulwer, WILLIAM HENRY LYTTON EARL LORD DALLING AND BULWER, statesman, an eld brother of Lord Lytton, was born in 1801 London. Educated at Harrow and Cambridge, in 1827 entered the diplomatic service, and in 18 became a member of Parliament as a radic reformer. After being secretary of embassy Constantinople and Paris, he was from 1842 to 184 minister plenipotentiary at Madrid, and 1849 Washington, where he negotiated the well-know Clayton-Bulwer treaty relating to the communic tion between the Atlantic and Pacific Oceans ship canal. He held other diplomatic appointment among them English ambassador to the Porte, an on returning to England he in 1868 re-entere

Parliament. In 1871 he was raised to the peerage, and in the following year he died at Naples. There being no issue, the title became extinct. Among his writings were *An Ode to Napoleon*, *An Autumn in Greece*, *Life of Byron*, *Historical Characters*, and *Life of Palmerston*.

Bumboat, a wherry, chiefly employed to carry provisions from the shore to a ship. A shore-boat as distinguished from a ship's boat.

Bunbury, HENRY WILLIAM, caricaturist, second son of the Rev. Sir William Bunbury, of Mildenhall, Suffolk, was born in 1750. As a boy he earned the reputation of being a comic draughtsman, and while at Westminster school etched *A Boy riding upon a Pig*, which is preserved in the British Museum print room. He entirely abstained from caricaturing political subjects. He died in 1811. His second son, Sir Henry Bunbury, who was born in 1778, and died in 1860, wrote several historical treatises.

Bundelkhand, a territory of the North-Western Provinces, India, lies between the Jumna on the N.E., and the Chambal on the N. and W., and belongs partly to Britain and partly to native chiefs tributary to Britain. Its area is about 20,000 square miles, and embraces the five districts belonging to the British North-Western Provinces, Bauda, Jalaun, Jhansi, Lalitpur, and Hamirpur, and thirty-one native states. The produce is mostly agricultural, though in some parts iron ore, copper, and diamonds are found. The chief towns are Jhansi, Baudah, and Chatterpoor.

Bundi, a state of Hindostan, is surrounded by Jaipur, Tonk, Kotah, and Udaipur, and covers an area of 2,300 square miles. It is also the name of the chief town, which is surrounded by walls, and has between 400 and 500 shrines and temples.

Bungalow (Hindustani *Bangla*, *i.e.* a Bengalese house), a one-storeyed house, usually built of unbaked bricks, and with a thatched roof. The name probably comes from the district where Englishmen noticed it first. A *dawk* (dák) *bungalow* is a house maintained, usually by the Government, where travellers can break their journey and find fresh horses or men.

Bungarus, a genus of venomous snakes, allied to the cobra (q.v.), but without the power of dilating the neck, from the Oriental region. There are two Indian species, both common. *B. fasciatus* (or Bungarum pamah) and *B. cæruleus* (the krait). According to Sir J. Fayrer, this last is probably, next to the cobra, the most destructive snake to human life in India.

Bungener, LOUIS FELIX, writer, was born in 1814, at Marseilles. The distinguishing feature of his writings was the romance form in which he presented the doctrines of Protestantism. He died in 1874.

Bunion, a term applied to a swelling produced by the development of a bursa over the great toe joint. The pressure of a badly-fitting boot is particularly apt to lead to mischief in this region of the foot. The great toe becomes distorted and half dislocated, and over the prominence of the joint where pressure is most felt a bursa (q.v.) forms, and this may or may not communicate with the joint itself. If the bursa is merely inflamed, rest, the removal of all pressure, and the application of cold, will afford temporary relief. If suppuration occurs poultices should be applied, and the sac may require to be laid open to evacuate the matter which has formed. In some neglected cases the toe may have to be amputated. If the proper remedy is obtained in the first instance, however, the trouble need never attain to serious proportions. A well-fitting boot is the only preventive of troubles of this kind.

Bunker Hill, a celebrated elevation 110 feet high in Charlestown, a suburb of Boston, Massachusetts, was the scene, on June 17, 1775, of one of the hardest contested battles in the American war of Independence. Though the British remained masters of the field, they lost over 1,000 men, while the American loss was about 500. An obelisk 221 feet high marks the site of the American entrenchments.

Bunkum, or BUNCOMBE (said to be derived from the name of a county in North Carolina, U.S., because its representative in Congress persisted in speaking in an impatient house, simply to please his constituents), political claptrap, or mere "tall talk," uttered not from conviction, but to gain support, or to create an impression.

Bunodont, a term used to denote the molar teeth of the Suine section (Pigs and Hippopotamuses) of the Artiodactyla, grouped under the name Bunodonta (literally hill-toothed) by Kowalewsky. The molar teeth have a crown of four or five columns, forming low subconical tubercles. The remaining members of the order are called Selenodonta; and Selenodont is used to denote their molars, which have crescentic ridges.

Bunotheria, an order of mammals made by Professor Cope to include Professor Marsh's order Tillodontia and his own family Tæniodontia, *i.e.* the genera *Tillotherium*, from the Lower Eocene, *Platychærops*, from the London Clay, and *Esthonyx* and *Calamodon*, from the Wasatch Middle Eocene of Wyoming. Their cheek-teeth have massive squared crowns, and their general characters harmonise with the view that both ungulates and rodents have been derived from a primitive carnivorous stock. Cope regards these forms as near to the ancestral type of the Rodentia, and allied to that of the Edentata.

Bunsen, CHRISTIAN CHARLES JOSIAS, BARON VON, diplomatist and writer, was born in 1791 at Corbach, in the principality of Waldeck, his father being a pensioned soldier. From school he went to Marburg university, and thence to Göttingen. Becoming private tutor to Mr. Astor of New York, he had an opportunity of travelling. At Berlin in 1815 he became acquainted with Niebuhr, on whose recommendation he received the appointment in 1818 of secretary of the Prussian legation at Rome, gaining the position of resident minister in 1827. Recalled from Rome in 1838, he came to

England, where, excepting a short stay as Prussian ambassador to Switzerland in 1839–41, he remained during the rest of his official life, which ended with the breaking out of the Eastern question in 1854. He thereafter retired to Heidelberg, and finally settling at Bonn, died there in 1860. Bunsen was highly esteemed in England, with which he was connected by more than one tie. Among his works were *The Church of the Future*, *Egypt's Place in Universal History*, *Hippolytus and his Time*, and *Bible Commentary for the Community*, his chief work. His *Memoirs* were published in 1868 by his widow, who was the eldest daughter of Mr. B. Waddington, of Llanover, Monmouthshire.

Bunsen, ROBERT WILHELM, chemist, was born in 1811 at Göttingen. Having studied in the university of his native place, at Paris, Berlin, and Vienna, he became professor of chemistry in Cassel, Marburg, Breslau, and Heidelberg in succession. At Heidelberg he built a grand laboratory and made it one of the best schools of chemistry in Europe. Among his discoveries are the production of magnesium in large quantities, the spectrum analysis, the electric pile and the burner, which are named after him, and hydrated oxide of iron as an antidote to arsenic poisoning, which last has saved many lives, and was rewarded by a gold medal from the Prussian Government. Among his chief works are, *On a new Volumetric Method*, *A Treatise on Gas Analysis*, and *Chemical Analysis by the Spectroscope*. He died in 1899.

Bunsen Burner consists of a small gas jet, above which is screwed a brass tube, at the bottom of which are holes to admit air. The air and gas mix together in the tube, and burn at the top with a flame which should be perfectly non-luminous. It is largely used in chemical operations, as it gives greater heat than an ordinary gas flame, and leaves no sooty deposit on objects placed in it.

Bunter-sandstein, the name, the first half of which is generally adopted, for the lowest of the three divisions of the Triassic formation of Germany, derived from the highly-coloured or variegated sandstones of which it mainly consists. It is sometimes 1,000 feet thick, and is divided into the *Lower Bunter*, or *Grès des Vosges*, fine reddish argillaceous sandstone, often micaceous and fissile, with layers of dolomite and pisolite (*Rogenstein*); the middle, or *Voltzia-sandstones*, coarse-grained sands and sandstones containing the cypress-like *Voltzia heterophylla*, with layers of shale containing the bivalve crustacean *Estheria minuta*; and the upper, or *Röth*, red and green marls with gypsum, containing the pelecypod *Myophoria costata*. The Bunter is usually barren of fossils; but plants such as *Voltzia*, *Albertia*, and *Equisetum arenaceum*, have been found at Sulzbad, near Strasbourg, and footprints of *Labyrinthodon* at Hildburghansen in Saxony. First identified in England by Sedgwick in 1826, the Bunter with us varies from 1,000 to 2,000 feet in thickness, and falls into three divisions: *Lower Mottled Sandstone*, soft, bright red and variegated, much false-bedded, 650 feet thick at Bridgenorth, 400 feet in Cheshire, and 200 feet in South Staffordshire; the *Pebble-beds*, or *Conglomerate*, reddish-brown sandstones with quartzose pebbles, from 60 to 750 feet thick, to which the white sandstone of Nottingham belongs; and the *Upper Mottled Sandstone*, generally red or yellow, developed near Liverpool and Birmingham, and reaching a thickness of 700 feet in Delamere Forest. The Bunter series occupies much barren land, such as Cannock Chase and Sherwood Forest; but it contains lead and copper-ores at the former place, and is generally a water-bearing series. In France it is known as the *Grès bigarré*. In the Gondwana series of India are fresh-water beds (Karharbári) containing a Bunter flora; whilst the *Werfen*, or *Gröden sandstones* and *Guttenstein limestone* of the eastern Alps, with *Ceratites cassianus*, etc., are the marine or open sea equivalent of the Röth or Upper Bunter of Germany. Like most Trias (q.v.), Bunter beds have generally originated in inland lakes to which the sea found occasional access.

Bunting, the popular name of any bird or species of the family Emberizidæ, ranging over the palæarctic region to India in the winter. Buntings are chiefly distinguished from the Finches by the presence of a palatal knob on the upper mandible, the lower mandible being compressed at the side so as to form a sort of anvil on which this knob works—crushing the grain and seeds which form the principal food of these birds. Of this family four are resident in Britain: (1) *Emberiza miliaris*, the Common or Corn Bunting or Bunting Lark, most numerous in the southern counties, is rather more than seven inches long; plumage brown, with markings of a darker shade on the upper surface, brownish-white beneath with spots of dark-brown on the neck and throat. The nest is usually in or on the ground; eggs four to six, dull purplish-white. (2) *E. cirlus*, the Cirl Bunting, found locally near the south coast, is a rarer bird, and somewhat smaller; general plumage resembling that of the Yellow Bunting; head dark olive, streaked with black and yellow. (3) *E. citrinella*, the Yellow Bunting, Yellow Hammer (prop. Yellow Ammer, *i.e.* the Yellow Chirper), is one of the commonest British birds; length, seven in.; plumage, shades of yellow, marked and mottled with brown, the mottlings becoming darker in the winter. The nest is usually on or near the ground, and the male is said to take part in incubation; eggs four to five, purplish-white, veined with purple. This bird may be reckoned among the farmer's friends, from the quantity of insects it destroys and the multitudes of seeds of noxious weeds it consumes. (4) *E. schœniclus*, the Reed Bunting, or Reed Sparrow, sometimes wrongly called the Blackheaded Bunting (*see* below), is found in marshy situations, usually nesting among long grass; eggs five to seven, clay-colour, marked with purple-brown or black. Length, six inches; head black, with white collar; plumage of upper surface dark, feathers of back and wings edged with bright bay; chin and throat black; under surface, white, streaked with brown on sides. The Buntings that visit Britain more or less frequently are *E. rustica*, the Rustic Bunting, and *E. pusilla*, the Little Bunting, from the north-east of Europe and Asia; *E. hortulanus*,

the Ortolan (q.v.); *Plectrophanes nivalis*, the Snow Bunting (q.v.), with its congener *E. lapponicus*, the Lapland Bunting; and *Euspiza melanocephala*, the Black-headed Bunting, from the south-east of Europe and Asia. *E. americana*, an American form, differs little from the common Bunting.

Bunting, JABEZ, Wesleyan minister, was born in 1779 in Manchester. President of the Wesleyan Conference in four different years, and in 1835 appointed President of the Wesleyan Theological Institute, he became the leading authority on all questions of Church government in the body he guided. On the death of Richard Watson he also became head of the Wesleyan Missions. He died in 1858 in London.

Bunyan, JOHN, was born in 1628 at Elstow, near Bedford. His father was a tinker, and Bunyan himself followed the same craft, serving as a soldier during the Civil war. Thereafter he became impressed with the sense of the importance of religion, and began to preach in the villages round about Bedford. In 1656 appeared his first book, which was an attack upon the Quakers, and was entitled *Some Gospel Truths Opened*. In 1660 he was arrested while preaching in a hamlet near Ampthill, thrown into prison, and detained there until 1672, during which time he wrote *Profitable Meditations*, *The Holy City*, *The Resurrection of the Dead*, *Grace Abounding to the Chief of Sinners*, and other works. Liberated under the Declaration of Indulgence, he became parson of the church to which he belonged, but in 1675 was again sent to prison for six months under the Conventicle Act. It was during this period of his incarceration that he produced the first part of the immortal allegory, *The Pilgrim's Progress*. Other of his works that followed were *Life and Death of Mr. Badman*, 1680, and *Holy War*, 1682. After having ministered to the Bedford congregation for sixteen years, he died in London in 1688, and was buried in Bunhill Fields.

Bunzlau, (1) a town of Prussia in the province of Silesia, is situated on the right bank of the Bober. It manufactures earthenware and hones chiefly. It was the scene of a battle between the French and the Allies in 1813. BUNZLAU, (2) frequently called JUNG BUNZLAU to distinguish it from Alt Bunzlau on the Elbe, a town of Bohemia, is situated on the left bank of the Iser.

Buol-Schauenstein, KARL FERDINAND, COUNT, statesman, was born in 1797, and died in 1865. After representing Austria at the Dresden conference of 1850, he became ambassador at London. He next became Austrian foreign minister, was president of the Vienna Congress of 1855, and Austrian representative at the Congress of Paris.

Buononcini, or BONONCINI, GIOVANNI MARIA, Italian composer, was born in 1640, and was the father of Marc Antonio and Giovanni Ballesta Buononcini, who also became famous as composers during the 18th century.

Buoy, a floating case, used either for supporting a man in the water or for marking a channel, an anchorage, or a dangerous spot. Buoys intended for supporting human beings afloat are called life-buoys, and are either of canvas lined with cork, formed in the shape of a ring, or of sheet-iron fashioned into an air-tight vessel, and often provided with a "flare-up," or torch, which spontaneously takes fire upon immersion in water. Buoys used to denote channels are of various shapes. As employed by the Corporation of Trinity House, spirally painted buoys mark the entrances or turning points of channels; single-coloured can buoys, either black or red, mark the right-hand side of a channel going in; chequered, or vertically-striped can buoys mark the left-hand side; and, if further distinction be necessary, right-hand buoys are surmounted by globular frames and left-hand buoys by cages. The ends of middle grounds are marked by buoys with horizontal rings of white, bearing or not bearing above them a staff, diamond, or triangle. Wrecks are marked by green nun-buoys, *i.e.* buoys shaped like two cones placed base to base. Anchor buoys are small buoys, of no special prescribed shape, dropped from a ship's side before the anchor is let go, to denote its position. This operation is called "streaming the buoy."

Buoyancy, the power possessed by a floating body to support weight without sinking. [HYDROSTATICS.]

Buphaga. [BEEF-EATER.]

Buprestidæ, a family of beetles, mostly found in the tropics; these are usually of brilliant metallic colours; the Northern species are small and inconspicuous.

Burbage, RICHARD, actor, was born about 1567, and was the son of James Burbage, also an actor and theatrical manager. His rapid progress earned for him, while he was only about 20, the sobriquet of "Roscius." He was associated with Shakespeare, Fletcher, Hemming, and Condell, in some of his undertakings, and, taking the chief rôle in new pieces, was thus the original Hamlet, Lear, Othello, Richard III., etc. He was also a successful painter, and a picture by him presented by William Cartwright, the actor, to Dulwich College, and still preserved there, is described in Cartwright's catalogue as "a woman's head on a boord done by Mr. Burbige, ye actor." Burbage died in 1618.

Burbot (*Lota vulgaris*), the sole species of the genus and the only freshwater fish of the cod family. It is found in the rivers of the midland and eastern counties, is widely distributed in Europe, and occurs in India and Siberia. English specimens are rarely more than from 2 lbs. to 3 lbs. in weight, but fish of 16 lbs. have been taken from the Austrian lakes, and specimens of 30 lbs. are recorded from the Rhine. The Burbot is a freshwater ling (q.v.), and differs from that fish chiefly in the disposition of the fin-rays. Colour olive-green, spotted with black, above; whitish beneath. The flesh is white, firm, and well-flavoured. An oil obtained from the liver was formerly of some repute in medicine.

Burchett, JOSIAH, who was born about 1660, and who in 1688 succeeded Samuel Pepys as Secretary of the Admiralty, was an able administrator and a trustworthy naval historian. His *Complete History of the most Remarkable Transactions at Sea*, in five books, was published in 1720. He died in 1747.

Burckhardt, JOHN LUDWIG, traveller, was born in 1784 near Lausanne, Switzerland. In 1806, after studying at Leipsic and Göttingen, he came to London with an introduction to Sir Joseph Banks, and undertook to explore the interior of Africa for the African Association. Inuring himself by practice to hunger, thirst and exposure, he set out in 1809 in the disguise of a Mussulman, and under the name of Sheikh Ibrahim Ibn Abdallah he journeyed through Syria, Lebanon, and the Hauran to Palmyra, and in 1812 through Palestine to Petra, crossing the desert to Petra. Among his most daring exploits, however, was his pilgrimage to Mecca, which is death to an unbeliever. Examined by a committee of Mohammedan judges, chosen by Mehemet Ali, he was pronounced to be an excellent Moslem, and setting forth, he performed all the rites of the pilgrimage with accuracy, dined with the chief judge of Mecca, and recited the Koran to him. In 1816 he ascended Mount Sinai. Returning to Cairo, he was there seized by dysentery, and died October 15th, 1817. His travels were published posthumously, and are distinguished for their truthfulness.

Burden, the measure of merchandise that a ship will carry when she is fit for sea. Formerly ships were spoken of as being of so many tons burden. To find a ship's burden, according to the method then in use, multiply the length of the keel, taken within-board, by the breadth of the ship at the midship beam; multiply the product by the depth of the hold; and divide the last product by 94 The quotient is the tonnage required. A ship is now often, and should be always, measured by the weight, in tons, of water which she displaces when she is at her load water-line.

Burden of Proof. In English law, a statement of fact is said to be proved when the tribunal before whom the case comes for trial is convinced of its truth, and the evidence in support of it is known as "the proof." Where a person makes an allegation he is generally bound to prove it, and the onus or burden of so doing properly falls on him, the rule being that the burden of proof lies with the party who asserts the affirmative of the issue or question in dispute. Where a presumption only is so raised, he is said to shift the burden of proof—in other words, his allegation is taken to be true unless his opponent adduces evidence to rebut such presumption.

Burder, GEORGE, parson, was born in 1752, in London. Educated for an art career, he began to preach in 1776, receiving a charge at Lancaster in 1778. In 1808 he became secretary to the London Missionary Society and editor of the *Evangelical Magazine*, in succession to the Rev. John Eyre. His writings were immensely popular, the chief being his *Village Sermons*. He died in 1832, and was buried in Bunhill Fields.

Burdett, SIR FRANCIS, politician, was born in 1770 and educated at Westminster school and Oxford University. In 1793 he married Sophia, youngest daughter of Coutts, the banker. Entering Parliament in 1796, he became distinguished for his advanced views and forcible attacks upon the Government. In 1810 he published in Cobbett's *Political Register* a letter to his constituents impugning the right of Parliament to commit for libel. This led to the issue of the Speaker's warrant for his arrest. He barricaded himself in his house, however, and succeeded in defying the authorities for two days, during which a riot occurred and one man was killed in an encounter between the populace and the soldiers. He was liberated on the prorogation of Parliament, being again imprisoned for three months and fined £1,000 for his condemnation of the Peterloo Massacre. Latterly this fierce Radical became a Tory, and from 1837 until his death in 1844 represented North Wilts.

Burdett-Coutts, THE RIGHT HONOURABLE ANGELA GEORGINA, BARONESS, daughter of the preceding, was born in 1814, succeeding in 1837 to the great wealth of her grandfather, Thomas Coutts. This she largely devoted to charitable purposes, making for herself a reputation unique among her peers. Among other benefactions she endowed the three colonial bishoprics of Adelaide, Cape Town, and British Columbia; paid for Sir Henry James's topographical survey of Palestine; established a shelter and reformatory for fallen women; presented to London Columbia Market; built model-dwellings; laid out recreation grounds; assisted the People's Palace; fitted out poor families for emigration; started the shoeblack brigade; in a word, she liberally promoted every humane object. In 1871 she was made a peeress; in 1874 presented with the freedom of the City of London, and in 1881 married to Mr. William Lehmann Ashmead-Bartlett, an American, who in 1882 obtained the royal licence to use the name of Burdett-Coutts. She died in 1906.

Burdock, *Arctium Lappa*, the one species, with several sub-species distinguished by inconstant characters, of a genus of Compositæ belonging to the tribe Cynareæ of the sub-order Tubulifloræ. It is a stout biennial growing in almost any climate or soil throughout most of the northern hemisphere. In Japan it is cultivated as a vegetable, its young stems, the juice of which is watery, resembling asparagus. Its scattered leaves, often over a foot across, are cottony beneath, and its involucre of stiff hooked spinous bracts form the globular "bur" that gives it its name. *Arctium*, from the Greek *arktos*, a bear, refers to its roughness; and *Lappa*, from the Keltic *llap*, a hand, to the hooks. The corollas are all tubular and crimson; the anther lobes have appendages, and the fruitlets bear several rows of simple pappus hairs.

Bureau (French, *a writing table*), has passed from French to English through the United States in the sense of an office or department of public

administration. Hence "BUREAUCRACY"—government by trained officials according to official traditions, as contrasted with government by persons elected by the people, with no special training for the work.

Burette, an instrument used for measuring out definite quantities of liquid. One of the most convenient forms consists of a cylindrical glass tube tapering at lower end, and provided with a pinchcock of glass stopcock. The tube is graduated either in tenths of a cubic centimetre or in grains, according to requirements.

Burg, a town of Prussia, in the province of Saxony, is situated on the Ihle. Its woollen manufactures are noted.

Burgage Tenure indicates the particular feudal service or tenure of houses or tenements in ancient cities or boroughs. It is considered a species of socage, as the tenements are holden of the sovereign or other lord either by a fixed annual pecuniary rent, or by some services relating to trade or handicraft, such as repairing the lord's buildings, providing the lord's gloves or spurs, etc. The incidents of this tenure, which prevailed in Normandy as well as in England, vary according to the particular customs of each borough. Burgage tenure is supposed to have been the foundation of the rights of voting for members of Parliament in cities or boroughs, and the great variety of these rights is partially explained by the particular local customs. One of the most remarkable customs of burgage tenure is that known as "Borough English." [BOROUGH.]

Bürger, GOTTFRIED AUGUST, lyric poet, was born in 1747 at Molmers-wende, a village in the principality of Halberstadt; studying at Halle and Göttingen, he led an irregular life which landed him in debt and other difficulties. Becoming associated with Voss, the two Counts Stolberg, Boje, and others, he became inspired with higher motives than had hitherto guided him, and in 1773 appeared his ballad *Lenore*, which at once established his reputation. *The Wild Huntsman* and other of his ballads were translated by Sir Walter Scott. Though Bürger was a popular lyrist, he was yet left to cultivate the muses in poverty, and after an unhappy life he died in 1794 at Göttingen.

Burgess, a member of a borough. The Municipal Corporation Act, 1882, defines who shall be the electors of the municipal council, and by sect. 9 a burgess or freeman is defined as a person of full age, not an alien, nor having received within the preceding twelve months parochial relief or other alms, and who on the 15th day of July in any year shall have occupied any house, warehouse, counting-house, shop or other building within the borough during the whole of the preceding twelve months, and during such occupation shall have resided within the Borough or within seven miles thereof; and shall during such time have been rated in respect of such premises to all rates for the relief of the poor, and have paid on or before the 20th of July in such year all such poor and borough rates in respect of the same premises, as shall have been payable up to the preceding 5th of January, and he must have been duly enrolled as a burgess on the *Burgess Roll*, but when the qualifying premises came to the party by descent, marriage, marriage settlement, devise, or promotion to any benefice or office, the occupancy and rating of the predecessor may be reckoned as part of the twelve months; and to the qualification above prescribed the £10 occupation qualification under the Registration Act, 1885, has now been added by the County Electors Act, 1888.

In Scotland persons could always be elected burgesses by the magistrates of the burgh. The subject of the election of burgesses is now regulated by the Acts 23 and 24 Vic. c. 47, and 39 Vic. c. 12. The last-mentioned statute was passed for the purpose of assimilating the law of Scotland in some measure to that of England.

Burghley, WILLIAM CECIL, LORD, statesman, was born in 1520 at Bourn, Lincolnshire. From Cambridge he went to Gray's Inn to prepare for the legal profession. In 1545 he married Sir Anthony Cooke's daughter, which drew upon him the patronage of the Protector Somerset, who made him master of requests in 1547, and in 1548 his secretary. In 1550 he became secretary of state and effected many important commercial changes. In Mary's reign he held no public office, and contrived to live through those perilous times without compromising himself. On Elizabeth's accession he became chief secretary of state and a privy councillor, and for the remainder of his life was at the head of public affairs. It was Burghley's sagacity and shrewdness that made Elizabeth's reign glorious. In 1571, on the suppression of the northern rebellion, the queen created him Baron Burghley. He died in Cecil House in the Strand in 1598, and was buried in Westminster.

Burgkman, HANS, engraver and painter, was born in 1473 at Augsburg. He is supposed to have been a pupil of Albert Dürer, and was the father-in-law of the elder Holbein. It is as a wood engraver rather than a painter that he is best known, and his chief work is the series of 135 cuts representing the triumphs of the Emperor Maximilian. He died in 1531 in his native town.

Burglary, or nocturnal housebreaking, has always been considered a very heinous offence, seeing that it always occasions frightful alarm, and often leads to murder. Its malignity, also, is forcibly illustrated by considering how particular and tender a regard is paid by the law of England to the immunity of a man's house, which it styles "his castle," and will never suffer to be violated with impunity, agreeing therein with the sentiment of Cicero, "*quid enim sanctius, quid omni religione munitius, quam domus unius cujusque civium.*" For this reason no outer doors can in general be broken open to execute any civil process, though in criminal cases the public safety supersedes the private immunity. Hence also, in part, arises the animadversion of the law upon eavesdroppers, nuisancers, and incendiaries; and to this principle it must be assigned that a man may assemble people together lawfully (at least if they do not exceed eleven) without danger of raising a riot, rout, or unlawful

assembly, in order to protect and defend his house, which he is not permitted to do in any other case.

The definition of a burglar as given by Sir Edward Coke is, "he that by night breaketh and entereth into a mansion house with intent to commit a felony." There are four things which go to make up this definition. For (1) *the time* must be night and not day; for one who is attacked by night may lawfully kill his assailant, but not so in general if it be by day. Anciently the day was reckoned to commence with sunrising and to end at sunset, but the better opinion afterwards was that, if there were daylight or crepusculum enough begun or left to discern a man's face, it was no burglary, but this did not extend to moonlight, for then many midnight burglaries would have gone unpunished, and, besides, the malignity of the offence does not so properly arise from its being done in the dark, as at the dead of night when all creation is at rest. It has now been enacted by statute 24 and 25 Vict. c. 96 that, so far as regards the crime of burglary, the night shall be deemed to commence at nine o'clock in the evening and to conclude at six o'clock the next morning. (2) As to *the place;* it must be a mansion or dwelling-house, for no distant barn, warehouse or the like are under the same privileges nor looked upon as a man's castle or defence, nor is a breaking open of houses where no man resides, and which therefore, for the time being, are not mansion-houses, attended with the same circumstances of midnight terror. A house, however, wherein a man sometimes resides, and which the owner has only left for a short season, *animo revertendi*, is the object of burglary, though no one be in it at the time of the fact committed. (3) *The manner.* A burglary requires (for the complete offence) both a breaking and an entry, but they need not be both done at once. There must in general be an actual breaking, for if a person leaves his doors and windows open it is his own folly and imprudence, and if a man enters thereby it is no burglary; yet, if he afterwards unlocks an inner door, it is so; but to enter by coming down a chimney is a burglary, for that is as much closed as the nature of the thing admits. So also to knock at a door, and upon opening it to rush in with a felonious intent, or under pretence of taking lodgings to fall upon the landlord and rob him, etc., are burglaries, though there be no actual breaking. (4) *The intent.* There must be a felonious intent to constitute the crime, otherwise it is only a trespass, but such intention need not be actually carried into execution; it is sufficient if it be demonstrated by some overt act, and therefore a breach and entry by night, with intent to commit a robbery, a murder, a rape, or any other felony is burglary, whether the thing be actually perpetrated or not. So much for the nature of burglary, which (when committed under certain circumstances of aggravation) was until recently a capital offence, but the punishment for it is now regulated by the above-mentioned statute passed in the year 1861, under which whoever shall be convicted of the crime of burglary shall be liable to penal servitude for life, or any term not less than five years, or to be imprisoned for any term not more than two years, with or without (according to the heinousness of the circumstances) hard labour and solitary confinement. The distinction above pointed out between burglary and housebreaking does not prevail in Scotland. [HOUSEBREAKING.] There are State laws in the United States applicable to this crime.

Bürglen, a village in the canton of Uri, Switzerland, about one-and-a-half miles from Altdorf. It enjoys the credit of being the birthplace of that mythical hero, William Tell, and even the house in which the event took place is shown, its walls adorned with paintings of his patriotic exploits.

Burgomaster, the name formerly given to the chief magistrate of a city.

Burgos, formerly the capital of the kingdom of Old Castile, Spain, and now the chief town of the province which bears its name, stands on a hill above the river Arlanzon at a distance of seventy-five miles from Madrid. The city cannot be traced back in history beyond the ninth century, when a castle was built here to resist Moorish encroachments, and a prosperous settlement gathered round it. For a time it was the residence of the sovereigns, and sank much in importance after the fifteenth century, the Court being established at Madrid. In 1808 the Spaniards were defeated under its walls by Soult, and in 1813 it was taken by Wellington, after an unsuccessful attempt in the previous year. In the old quarters are many interesting specimens of street architecture; whilst the modern suburbs beyond the river and on an island in mid-stream are pleasantly laid out with promenades and gardens. The cathedral, begun by Bishop Maurice, an Englishman, in 1221, and finished in 1567, is a notable example of the florid Gothic style. The fine town hall contains the bones of the Cid and his wife. Among other remarkable structures are the palace of Velasco, the Doric arch of Fernando Gonzalez, the church of St. Paul, and the majestic gate of Santa Maria. Burgos is the seat of an archbishopric, the headquarters of a strong military force, and the legal centre of a large district. It possesses seven great hospitals, several convents, important schools, of which the institute superior is the chief, and considerable manufactories of linen, woollen, and leather goods, as well as of paper, stockings and hats. The markets are abundantly supplied by a wide agricultural area.

Burgoyne, JOHN, supposed by some to have been the natural son of Lord Bingley, was born in 1730 and educated at Westminster, entering the army very early. He made a runaway match with Lady Charlotte Stanley, daughter of the Earl of Derby, and was for some time in disgrace. In 1760, however, he was employed in the Belle Isle expedition, and next year sat for Midhurst in Parliament, until he went with Lord Loudoun to Portugal, where he displayed great skill and daring. He was elected on his return to represent Preston, and moved a vote of censure on Clive in 1773, but in 1775 was sent out to America with reinforcements, taking part in the battle of Bunker Hill. Two years later he was given the command of a force to co-operate against the colonists from the Canadian

side. He took Ticonderoga and Fort Edward, but allowed himself to be cut off at Saratoga by Gates, and signed the famous capitulation which formed the turning point of the war. He defended his conduct with ability, and after a period of disfavour was restored to his rank in 1782, and made commander-in-chief in Ireland. He served as one of the managers in the impeachment of Warren Hastings. His leisure was devoted to poetry and the drama, for which he possessed some slight talent, his best and most successful play being *The Heiress*. He died in 1792.

Burgoyne, Sir John Fox, Bart., G.C.B., son of the above, was born in 1782, and passing from Eton to Woolwich joined the Royal Engineers in 1798. His first taste of active service was in Abercromby's expedition to Egypt in 1800. He then accompanied Sir John Moore to Sweden and the Peninsula; fought under Wellington in Spain, and took part in the siege of New Orleans under Pakenham. During the long subsequent peace Burgoyne strongly advocated the strengthening of our national defences, and in 1845 was appointed inspector-general of fortifications. He went out to the Crimea in 1854 and was present at the battles of Alma, Balaklava, and Inkerman, directing the siege operations until recalled in 1855. On his return he received a baronetcy and an honorary degree at Oxford. In 1865 he became governor of the Tower, and three years later was raised to the rank of field-marshal. He died in 1871, having undergone a severe shock through the loss of his only son, the commander of the ill-fated turret-ship *Captain*, in 1870.

Burgundy (Fr. *Bourgogne*), the name given to the district occupied in the fifth century by the Burgundi or Burgundiones, a Teutonic race that pushed forward from the banks of the Oder and Vistula to those of the Aar and Rhone, where they established the first kingdom of Burgundy, the limits of which embraced parts of Switzerland as far as Geneva, a portion of Alsace, the basin of the Rhone up to its junction with the Durance, and much of the country between the Rhone and the Loire. After a dynasty of eight kings, Gundimar being the last, this territory was incorporated in the Frankish empire (534). After varied fortunes it was erected by Charlemagne into a duchy, which went to his natural son Hugues. At the break-up of Charlemagne's possessions the southern half was split up into two kingdoms, viz. Cis-Juran or Lower Burgundy (the second kingdom of Burgundy), and Trans-Juran or Upper Burgundy, the Jura forming the boundary between the two. These were ultimately united to form the kingdom of Arles, which in 1033 passed into the German empire. Meanwhile the duchy, comprising most of what was afterwards known as Burgundy, remained loyal to Charles the Bold, and was held by several Carlovingian nominees until in 1363 John gave it to his son, Philip the Bold, as a reward for his courage at Poitiers. Thus was founded the famous line of the Dukes of Burgundy, who in the fourteenth and fifteenth centuries overshadowed the French crown in magnificence and power. Jean sans Peur, Philip the Good, and Charles the Bold extended their territories so as to embrace Hainault, Holland, Brabant, etc., and to encroach westward upon France. The marriage of Mary, heiress of Charles the Bold, with the Archduke Maximilian, led to the union of the Franche Comté and the Dutch and Belgian districts with the empire as the "Circle of Burgundy," but the ancient duchy of Burgundy still remained a fief of the French king, and was presently constituted a province with these definite boundaries: on the N. Champagne, on the E. Franche Comté and Bresse, on the S. Lyonnais and Dauphiné, and on the W. Bourbonnais and Nivernais. It was divided into eight districts—Auxerrois, La Montagne, Auxais, Dijonnois, Autunois, Châlonnois, Charolois, and Mâconnois. Its parliament, instituted by Louis XI. in 1476, was celebrated, and met at Dijon, as did also later on a separate assembly of states-general, over which the military governor presided, the Bishop of Autun being at the head of the clergy, and the mayor of Dijon leading the third estate. The revolution put an end to the political privileges of the province, and left nothing but the name.

Burgundy Pitch. [Pitch.]

Burhanpur, a town in the Nimar district, Central Provinces of British India. It is situated on the N. bank of the river Tapti, at a distance of 280 miles from Bombay, with which it is connected by the Great Indian Peninsular Railway. Founded in 1400 A.D. by a Mahometan prince of Khandesh, it was annexed by Akbar two centuries later, and until 1635 was the Mogul capital of the Deccan. It was the scene of frequent contests between the Mahometans and the Mahrattas, and was finally ceded in 1760 by the Nizam to the Peshwa, who gave it over to Sindia. The British took the place in 1803, but restored it, and it was only in 1860 that it passed into our hands. Under the Moguls it is said to have had an area of five square miles, but the population fell steadily in the nineteenth century. However, the *boras*, or Mahometan itinerant merchants, have headquarters here, and the embroidered muslins, silks, and brocades adorned with silver and gold threads, for which the town has always been famous, are still made in some quantities. The Lal Kila, or Red Fort, built by Akbar, and the Jumma Musjid, founded by Aurungzebe, are buildings of interest.

Burial, the disposal of the dead by interment. Etymologically the meaning should be limited to this definition, though it is often so extended as to cover any method of disposing of corpses. The oldest, and to this day the commonest, method of effecting this is by inhumation. The idea expressed in Gen. iii. 19—that man was taken from the earth and would return to it—was echoed in classic mythology, which told of a loving Earth-mother, with arms wide enough to embrace all her children; and Milton borrowed from the ancients when he made the Archangel promise Adam that after a long and temperate life he should drop, like ripe fruit, into his mother's lap (*P. L.* xi. 530-6). The first burials were probably rude enough—a

mere hiding of the remains in the earth. But as man developed morally these would naturally be treated with greater respect. The growing idea of the continuity of human life was also a powerful factor in this matter. To early man Death was in very deed the twin-brother of Sleep, and the departed were conceived of as having the same wants and feelings as the living. Hence arose the practice of depositing utensils and arms in the grave, and on this conception was based the whole system of funeral sacrifice (q.v.). From the same conception arose the ancient idea that an unburied corpse was deprived of rest or denied admission to the world of spirits; and similar consequences are attributed to the denial of Christian burial. From fear to affection as a motive marks a long stage in evolution; and one of the first examples of this progress is found in Gen. xxiii., which no one can read without sympathising with the tone of sorrow in the words of Abraham—"my dead." From inhumation, whether preceded or not by cremation (q.v.), the step to some kind of memorial was easy, and of this the simplest and most widely distributed forms are the barrow (q.v.) and the cairn (q.v.). The desire to retain the remains of loved ones among the living probably gave rise to the practice of embalming (q.v.), the preserved bodies being afterwards deposited in wooden chests or in sarcophagi. These, though the principal, are far from being the only methods of disposing of the dead. The Sagas tell how the old sea-kings were placed after death on the deck of their ship, which was then covered with an immense mound of earth, or set on fire and sent to sea with all sails set. Some savage tribes erect or appropriate a hut as a dwelling for the dead. North American Indians in some parts dry the corpse and expose it on a scaffold, and a nearly similar exposure is practised by the Parsees in their Towers of Silence.

There is an inherent Common Law right in the parishioners of every parish in England to be buried in the parish churchyard. The mode of such burial is a matter of ecclesiastical cognisance. Under the statute 4 George IV., c. 52, the remains of persons against whom a finding of *felo de se* is had are to be privately interred in the churchyard of the parish, but no Christian rites of burial are to be performed over them. All burials must be registered. By an Act passed in the year 1857, provision is made for the constitution of a burial board in every parish, and where two parishes, each maintaining its own poor, are united together for ecclesiastical purposes, a burial board for the whole district, appointed by vote of the vestry, or meeting in the nature of a vestry, is properly constituted. No fee appertains to burial at Common Law, but it may be chargeable by custom or in virtue of particular statutes. The Common Law rule that every burial in a parochial churchyard must be celebrated according to the rites of the Established Church, has been abolished by the "Burial Laws Amendment Act 1880," which enacts that a deceased person may be buried within the churchyard or graveyard of a parish or ecclesiastical district or place without the Church of England burial service, provided proper notice be given to the incumbent. The burial may take place without any religious service or with any Christian and orderly religious service, but the Act only extends to burial grounds in which the parishioners or inhabitants of the parish or ecclesiastical district have rights of burial, and does not extend to other places nor authorise the burial of any person in a burial ground vested in trustees without the performance of any express condition on which by the terms of the trust deed the right of interment may have been granted. There are several statutes providing for the acquisition of new burial grounds where the existing ones are insufficient. The Public Health (Interments) Act, 1879, empowers local authorities to acquire, construct and maintain cemeteries subject to the provisions of the "Cemeteries Clauses Act, 1847," and the "Public Health Act, 1875."

In the United States it is a misdemeanor, in any one whose duty it is to do so, not to bury a dead body; also to omit to give notice to the coroner that a body on which an inquest should be held is lying unburied, or to bury or otherwise dispose of such body without notice to the coroner.

Buridan, JEAN, was born at Bethune, in Artois, about 1295, and studied philosophy in Paris under William of Ollam. He became a keen nominalist, and is said to have been driven out of France on that account, but there is no evidence of the fact. He wrote ably on logic, and commented with intelligence on Aristotle, especially discussing the theory of free-will as expounded in the Nicomachean ethics. The simile, however, of Buridan's ass (*l'âne de Buridan*), in which the soul, distracted by evenly-balanced motives, is compared to the animal placed between a measure of corn and a bucket of water, cannot be found in his works, and was probably an invention of his adversaries to throw discredit on his arguments. He died about 1360.

Buriti Palm, a name applied in the southern provinces of Brazil to *Mauritia vinifera*, a fine species of palm, growing 100 to 150 feet high, with fan-shaped leaves and small scaly nuts. Wine is made from the juice of the stem, another drink and a sweetmeat from the reddish-yellow pulp round the seed, hats, hammocks, and cordage from the epidermis of the leaves, and thatch from the old leaves; whilst the stems are used in raft and house-building, the kernels as vegetable ivory, and the roots in medicine. In Para it is called *Muriti*.

Burke (sometimes written BOURKE), EDMUND, the son of a Protestant attorney by a Roman Catholic mother, was born at Dublin probably in 1729, but as to this fact and his early life generally accurate information is wanting. Along with his elder and his younger brother he went to a school kept by Abraham Shackleton, a Quaker and a man of piety and learning, at Ballitore. Shackleton's son remained Burke's friend through life. Thence he passed to Trinity College, Dublin, and graduating without distinction, began in 1750 to keep terms at the Temple in London. His health was not strong, he had no great taste for the law, he enjoyed the clever and somewhat Bohemian society that the Temple furnished, and he began to work as a bookseller's hack or a contributor to magazines. In

1756 he made a great hit with *A Vindication of Natural Society*, a satirical imitation of Bolingbroke, which deceived many critics, and was only understood by the intelligent few to be an elaborate mockery of rationalism as applied to social and political institutions. The same year witnessed the publication of his *Philosophical Inquiry into the Origin of our Ideas on the Sublime and Beautiful*, a work which, in spite of crudity and narrowness, showed original power and great command of language, and won him the admiration and friendship of Dr. Johnson, Sir Joshua Reynolds, Warburton, Hume, and all the leading intellects of the day. *Hints on the Drama*, *An Abridgment of the History of England*, *An Account of the European Settlements in America*, occupied his time until 1759, when he began to compile for Dodsley the *Annual Register*. He had in the meantime married an amiable and gentle wife, in the person of Miss Nugent, the daughter of a physician at Bath. In 1761 he accompanied "single-speech" Hamilton, then Irish secretary, to Dublin, and for two years worked hard and learned much in his humble official post. A quarrel with his contemptible patron led to his resignation of the pension with which he retired, and Burke in 1765 became private secretary to Rockingham, who had just taken office as leader of the Whigs, and who procured him a seat for Wendover. His first night in the House was marked by a speech on American affairs that won him Pitt's cordial praise, and when at the end of a year, during which the stamp duty was repealed, general warrants condemned, and the cider tax abolished, the Rockingham ministry left office, Burke's reputation stood so high that Pitt made overtures to him, which he declined. In 1769 his pamphlet *On the Present State of the Nation*, in answer to Grenville's defence of his policy, proved him to possess a sound knowledge of commercial and financial matters as well as breadth and clearness of political views; and next year he wrote *On the Causes of the Present Discontents*, a masterpiece in its way, with the purpose of building up a new Whig party, in which Rockingham and Chatham could be united. It reveals that hatred of overstrained royal prerogative, and yet that conservative veneration for the monarchy, which supply the keynote of his creed; but it failed to commend itself to the leaders of rival factions, and during North's administration, from 1770 to 1782, Burke was the life and soul of the opposition, gradually acquiring, in spite of an unpleasant voice and delivery, a great command over the House. He had now bought, chiefly with borrowed money, a house and estate at Beaconsfield, and his scanty income was augmented for a time by his agency for New York and his literary earnings; but even with Lord Rockingham's generous help, and with the knowledge that he was never free from debt, we are not a little puzzled to find out how his means sufficed for the handsome, but not extravagant, style of life in which he indulged. He visited France in 1773, and in 1774 was returned free of cost for Bristol. Then followed his noble struggle for justice to the American colonists, during which he never for one moment abandoned his constitutional attitude or dallied with revolutionary principles. His *Speech on Conciliation* and his *Letter to the Sheriffs of Bristol* are the most eloquent and characteristic memorials of this period of his career. In 1780 he adopted three new causes, viz. the Roman Catholic claims, the movement in favour of economical reform, and the wrongs inflicted on India by Hastings and the East India Company. The first item in his programme cost him his seat at Bristol, but he found another at Malton, which he retained to the end of his political life. The utter failure of the king's American policy caused North to resign in 1782, and Rockingham, coming once more into power, made Burke paymaster of the forces and privy councillor. He displayed scrupulous honesty in a post where his predecessors had not hesitated to enrich themselves, but on the death of Rockingham he seceded from Shelburne along with Fox, formed the not very creditable coalition with North, and resumed office under the Duke of Portland in 1783. His India Bill, however, conceived in the same spirit as his measure of economical reform, with the aim, that is to say, of wresting patronage from the Crown to entrust it to ministers and to Parliament, broke up the ministry, and an appeal to the country in 1784 left the Whigs in a hopeless minority, and conferred lasting power on Pitt. Burke now concentrated his energies on the impeachment of Warren Hastings, and for nearly ten years he maintained this terrible conflict with unabated vigour, delivering a series of speeches that have never been surpassed for brilliancy of argument, power of invective, and pathetic dignity. That he was stimulated now and then by personal feelings to exaggerate his charge must, we fear, be conceded, but on the whole his conduct was inspired by a lofty sense of humanity and duty, and by a love of honour and justice. Before this struggle was over a new path was opened out to Burke by the course of the revolutionary movement in France, and he plunged into it with his usual impetuosity. Fox in 1790 spoke in favour of the French guards who had turned against their sovereign; Burke at once broke from his old colleagues, and after issuing ineffectually an *Appeal from the Old to the New Whigs*, brought out his most famous and effective manifesto, *Reflections on the Revolution in France, and on the Proceedings in certain Societies in London relative to that Event*. Nothing that has ever been written on political subjects has exercised a more striking and immediate influence on men's minds than this short but magnificent appeal to the highest conservative instincts of human nature. He was, of course, blind to the inevitable character of that Nemesis which had overtaken the French monarchy; he was unjust to the chiefs, who found themselves face to face with chaos; and his sympathies were rather with individuals than with nations. Still his horror of bloodshed and cruelty, his distrust in progress as divorced from religion and morality, his faith in reform of the old as opposed to theoretical reconstruction, and his hatred of the vulgar ignorance and coarse brutality of reckless demagogues, won him the support of many independent and honest minds as well as the effusive admiration of all who were interested in

monarchical institutions. Honours and congratulations were showered upon him, but politically he remained isolated, for though he withdrew from the Whigs, he declined to join the Tories. He submitted to Government a paper entitled, *Thoughts on French Affairs;* he urged with some success Catholic claims, and he wrote *Heads for Consideration on the Present State of Public Affairs;* but he was anxious to retire from parliamentary life, and bade farewell to the House in 1794, accepting the Chiltern Hundreds. But a cruel blow now fell upon him. His son, who had taken his father's seat for Malton, and was just starting for Ireland as Lord Fitzwilliam's secretary, died of rapid consumption. Utterly heart-broken, Burke spent his last years on his estate in the enjoyment of a pension, which he was compelled to defend in a *Letter to a Noble Lord.* His last effort, *Thoughts on a Regicide Peace,* betrayed little loss of intellectual vigour, but his constitution was completely undermined. He died peacefully and with dignity amid the consolations of religion on July 7, 1797, and was buried without ostentation or ceremony beside his son in the little church at Beaconsfield. Mr. John Morley has written an admirable *Life* in the *Men of Letters* series.

Burke, Sir John Bernard, Knt., C.B., LL.D., the son of an eminent Irish antiquary, John Burke, was born in London in 1815, and was called to the bar in 1839. He took up the work begun by his father, editing the *Peerage and Baronetage,* which he published yearly: compiling a valuable *History of the Landed Gentry,* and many interesting volumes on genealogical subjects, *e.g. Extinct Peerages, The Royal Families of England, The Vicissitudes of Great Families,* and *The Rise of Great Families.* In 1853 he succeeded Sir W. Betham as Ulster King-of-Arms, and was knighted, receiving the Order of the Bath in 1868. He died in 1892.

Burke, Robert O'Hara, was born at St. Cleram, in Ireland, in 1812. Settling in Australia, he became one of the most active explorers of the interior of that continent. Along with Wills he succeeded in crossing from Melbourne to the Gulf of Carpentaria in 1860, but they both perished next year on the return journey, after terrible sufferings from privation and drought.

Burke, or Bourke, Thomas Henry, was born of Catholic family at Knocknagur, county Galway, Ireland, in 1829, and having received his education in Belgium, in Germany, and at Trinity College, Dublin, became in 1847 private secretary to Sir Thomas Bedington, then Irish Secretary, and held the same post under Mr. Chichester Fortescue, Sir Robert Peel, and Lord Hartington. He had very early in his career provoked the animosity of the Nationalists by using the private papers of Smith O'Brien for the purpose of procuring his conviction, nor had his subsequent services at the Castle tended to diminish his unpopularity. In 1868 he was appointed permanent under-secretary, and it was his misfortune to be associated as a faithful subordinate with the coercive measures of successive governments. A secret band of desperadoes, styling themselves "The Invincibles," resolved to get rid of the objectionable official. He was stabbed whilst walking in the Phœnix Park (May 6, 1882) with the newly-appointed Chief Secretary, Lord Frederick Cavendish, whose life was also sacrificed. Joseph Brady, the ringleader in the conspiracy, with several other accomplices, was convicted of the crime in the following year chiefly through the treachery of James Carey, one of the gang.

Burke, William, an Irishman, who in the early quarter of the 19th century was employed as a porter in Edinburgh. His cupidity was excited by the high price paid, before the Anatomy Act, for bodies for dissection, and, in conjunction with another ruffian named Hare, he set about supplying subjects to the celebrated Professor Knox. Selecting vagrants and other friendless persons, he first made them drunk and then suffocated them. Suspicions were aroused at last, and Hare turned king's evidence against his partner, who admitted to having murdered fifteen persons. He was hanged in 1828, and his name, in the form of a verb, passed into the English language to express the sudden and secret smothering of any disagreeable fact.

Burkitt, William, was born at Hitcham in 1650, and became a theologian of some eminence. His *Expository Notes on the New Testament,* published posthumously, were much esteemed by divines of the 18th century. He died in 1703.

Burlesque (Ital. *burla,* ridicule), a dramatic caricature of some well-known story or literary work, usually set to music in part, and plentifully seasoned with puns, topical illusions, and songs. Less broadly comic productions of the same kind, or those where the element of caricature is less prominent, are often called extravaganzas. Colloquially the word is used to mean a mere mockery, as in the phrase "a burlesque of justice."

Burlingame, Anson, was born in Chenango county, New York, in 1822, and practised law at Boston. In 1854, '56, and '58 he was sent to Congress on the Republican ticket by one of the divisions of Massachusetts, and he supported Fremont in his unsuccessful presidential struggle against Buchanan. In 1861 he was appointed representative of the United States in China, and entering the Chinese service was ambassador of that country in America and in Europe until his death in 1870.

Burlington. 1. A county on the seaboard of New Jersey, U.S.A., the capital of which, bearing the same name, stands on the Delaware river, twenty miles above Philadelphia, and is a port of considerable traffic. It has a flourishing episcopalian college, and several public buildings. It was founded by Quakers in 1661.

2. The capital of Chittenden county, Vermont, U.S.A., and the largest town in the state, finely situated on the east shore of Lake Champlain, at the foot of a slope which is crowned by the Vermont university.

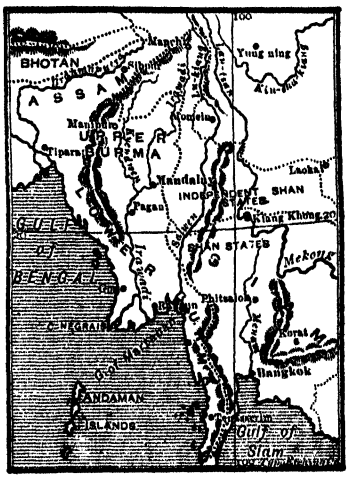
3. The capital of Des Moines county, Iowa, U.S.A., on the right bank of the Mississippi, 250 miles above St. Louis. It contains a business college, Baptist university, and many industrial

establishments. Being the centre of an extensive railway system, it is a very growing place.

Burma. The easternmost province of British India, bounded on the north and north-east by the Chinese dominions; on the east by the British Shan states and Siam, and on the west by the Bay of Bengal. It consists of Lower Burma, which was added to the Indian empire by the wars of 1824 and 1852; and Upper Burma, which was annexed by Britain in 1885. The physical structure of the country is that of a region seamed by chains of mountains running north and south, and watered by streams which flow southward into the Bay of Bengal. The mountain system is known to be connected with that of the Himalayas, and some of the rivers undoubtedly rise in the Tibetan plateau, but the intervening region between Tibet and Burma is one of the least known spots in Asia. The origin and physical structure of the Burmese rivers and mountains are still a matter of great uncertainty. The principal rivers are the Irawadi, the head stream of which rises east of Assam, which flows through Bhamo and west of Mandalay to discharge its waters by ten mouths into the sea; the Salwen or Lu-kiang, which rises in Tibet, and traversing the eastern confines of the province joins the Gulf of Martaban near Moulmein, and the Sittang. There are tributaries of the Irawadi, such as the Kyendwin, the Manipur river, the Shweli and Myitnge, which may be said to attain the dignity of separate rivers. The Irawadi, being navigable up to Bhamo, forms an important highway of communication; the Salwen is not navigable. Both rivers overflow the alluvial plains around their lower course in the rainy season. The northern part of the province is mainly an upland territory, containing much rolling country, intersected by occasional hill ranges, and varied by a few isolated alluvial tracts.

The chief products of Upper Burma are rice (of which, it is said, the Burmese count 102 sorts), grain, tobacco, cotton, mustard, hides, cutch, and indigo. Over a million tons of rice are exported yearly, and this great trade has been carefully fostered by the establishment of rice-cleaning mills at all the seaports. The principal export after rice is teak, which comes from the extensive forests of Burma and the Shan States, and overland from Siam. A cheap and coarse sugar is obtained from the juice of the Palmyra palm, which abounds in the tracts south of Mandalay; but most of the sugar used is imported. There is a great demand for this product, which increased cultivation would supply. The tea plant, which is indigenous, is cultivated in the hills, a few days' journey distant from the same spot. The common potato is largely cultivated by the Kakhyens on the Chinese frontier, where it is known by the name of the "foreigner's root."

The local supply of labour is inadequate to the demands, and during the harvest and rice shipping season there is extensive immigration, which is increasing from year to year. Unskilled labour is worth from 1s. to 1s. 6d. a day, and more during the season. It has been calculated that it takes as much money to construct one mile of road, or 100 cubic feet of masonry, in British Burma, as it does to make two miles, or 800 cubic feet, in India. Next to labour, the most urgent want of the country is land communication. It is said there are thousands of villages in Lower Burma alone which are shut off from trade for at least eight months of the year by reason of the lack of roads. Road-making is slow, owing to the want of labour and metal, no road metal being available in many



MAP OF BURMA.

districts except broken brick, which in a country with a heavy rainfall requires constant care and repairs. There are two lines of railway, one following the valley of the Irawadi, called the Irawadi Valley State Railway, connecting Rangoon with Prome, and the other extending from Rangoon to Mandalay.

Minerals. The geological structure of Lower Burma comprises three sections, western, middle, and eastern, nearly corresponding to the divisions of Arakan, Pegu, and Tenasserim. The rocks of Arakan belong to the secondary series, Pegu is tertiary, and Tenasserim primary. The economic products of the western division are petroleum, limestone, and coal. The middle or Pegu division produces laterite. The eastern division has not been much explored; but coal, limestone, tin, lead, gold, antimony, and graphite have been found. Upper Burma is rich in minerals. Gold is found in the sands of different rivers and also towards the Shan territory on the eastern frontier, which contains various metals. There are silver mines near the Chinese frontier, but they are not worked. Iron is worked in rude fashion at two or three places, and large deposits of rich magnetic oxide exist in the ridges east of Mandalay, near the Myit-nge river, while the same district contains lime in great abundance and of remarkable whiteness; statuary marble equal to the best Italian kinds is found about fifteen miles north of Mandalay. Mines of amber are wrought, and at Ye-nangyaung, on the

banks of the Irawadi, there are upwards of a hundred deep petroleum wells which yield oil in abundance for export. The precious stones produced are chiefly the sapphire and the ruby, which are found about seventy miles in a north-east direction from Mandalay. Before the British annexation no stranger was ever permitted to approach the locality, and all stones found were sent to the Crown treasury. The mines are now worked on concession by an English firm. The *Yu* or jade mines are situated in the Mogoung district. Momien in Yunan was formerly the chief seat of the manufacture of jade, and still produces a considerable quantity of small articles.

Fauna. The deep impenetrable jungles of Burmah afford shelter to many wild animals. Elephants and wild hogs are numerous, and the single and double-horned rhinoceros. There are nearly thirty kinds of carnivora, including the tiger, leopard, bear, and wild cat. Quadrumana are found in six or seven distinct species, hares are numerous, and among ruminants the barking deer, hog deer, *sambhar*, goat, antelope, bison, buffalo, and wild ox. The rivers, lakes, and estuaries swarm with fish. Aquatic birds abound in endless variety. Among other birds, pea-fowl, jungle fowl, pheasant, partridge, quail and plover are found throughout the country. Geese, ducks, and fowls are extensively domesticated, and cock-fighting is a favourite amusement with the people. The domestic animals are the elephant, buffalo, ox, horse, mule, ass, goat, sheep, and pig. The first three are used for draught, the elephant being especially useful in dragging timber. The horse is a small variety, rarely exceeding thirteen hands in height, and like the mule and ass it is used only as a beast of burden.

Population. Ethnically both Upper and Lower Burma vary considerably. In the former the Burmese people are the most numerous, after which come the Karens, natives of India, Talaings, Shans, Chins and others. Upper Burma is surrounded by numerous tribes of Kakhyens, Karens, Chins, and Singphos, who lead a rough life in their mountains and come down to levy blackmail on the more peaceful inhabitants. The population in 1901 was 10,490,624.

Commerce, Manufactures, etc. For centuries the seaboard of Burma has been visited by Arabs and other Asiatic races, and in the time of Cæsar Frederick, gold, silver, rubies, sapphires, long pepper, lead, tin, lac, and rice were exported. Of late years the commercial development of the country has more than kept pace with its rapidly increasing population. Since 1855 the external or sea-borne trade of the province has risen from £5,000,000 to £20,000,000 (taking the rupee at the conventional rate of exchange of two shillings), besides which there is considerable inland traffic with China (registered at Bhamo) and with the Shan states. The principal articles exported in 1908 were rice (Rs. 14,12,95,764), cotton (Rs. 29,30,257), jade and caoutchouc; the total value of exports from Burma into Great Britain in 1907 was £2,701,215. The total exports for 1907 amounted to £3,631,235. The chief imports are cotton piece goods, silk and woollen goods, oils, railway plant, iron, liquors and salt. Besides the important industry carried on by the rice mills, as mentioned above, which free the rice from the husk and prepare it for the European, American and Chinese markets, there are numerous steam timber saw mills at Rangoon, Moulmein, Tavoy and Shwegyin. Silk weaving was a favourite occupation with the Burmese, but it is said that the imported goods are underselling the local manufactures, and the industry is languishing. Lac ware is a characteristic manufacture, and most Burmese own vessels of this material. The groundwork of these articles is very fine bamboo wicker-work which is overlaid with coats of lac, the chief ingredient in which is the oil or resin from the *thitsi* tree. The Burmese show proficiency in the art of wood-carving, while other popular industries are boat-building, cart-making, mat-weaving, the manufacture of paper, umbrella-making, ivory carving, and stone-cutting. In the casting of bells and in elaborate metal-work they are specially skilful.

History. The Golden Chersonese, as Ptolemy designated it, has played an insignificant rôle in the world's history as compared with the other two great peninsulas of Asia—India and Arabia. Each of the three has been the home and stronghold of a powerful creed, but while Arabia and India have been intimately connected with modern civilisation, Burma has remained comparatively isolated and unknown. The Arakanese chronicle relates how the Burman peninsula was first colonised by a prince from Benares, who established his capital at Sandoway, and the royal history of Ava traces the lineage of the kings to the ancient Buddhist monarchs of India. From the eleventh to the thirteenth century the old Burmese empire was at the height of its power, and to this period belong the splendid architectural remains at Pagan. The city and dynasty were destroyed by a Mongol invasion in 1284 in the reign of Kublai Khan. Afterwards the empire fell to a low ebb, and Central Burma suffered largely from inroads made by the Tataings and Shans, and dynasties of the latter race often held sway. In 1404 the reigning Arakanese prince, Min Saw Mun, was dethroned, and took refuge in Bengal. Some years later he was restored by Mohammedan aid, and thenceforth the coins of the Arakan kings bore on the reverse their names and titles in corrupt imitation of Persian and Nagari characters, and the custom was continued long after their connection with Bengal had been severed.

The subsequent history of Burma forms a confused record of intestine strife and foreign war. Despite its mountain barrier, it lay at the mercy of both Burmese and Talaings, and its rulers were generally subject to the one or the other power. The close of the sixteenth century witnessed the last great struggle between Ava and Pegu, and the King of Arakan availed himself of the weakness of his neighbours in Bengal to extend his dominion over Chittagong and northwards as far as the Megna river. In the seventeenth century a new dynasty arose in Ava which subdued Pegu and

maintained supremacy up to the first forty years. The Peguans or Talaings then revolted, and having taken Ava and made the king prisoner, reduced the country to submission. It was then that Alompra arose. He had been first a hunter and then a Dacoit leader, and having made himself master of the capital, eventually, after four years' fighting, effected the subjugation of the Peguans. In the course of these hostilities the French sided with the Peguans and the English with the Burmese. He died in 1760, but not before he had reduced the town and district of Tavoy, Mergui, and Tenasserim, and was actually besieging the capital of Siam. In 1765, while the Burmese were waging war against the Siamese, a Chinese army of 50,000 men was despatched against them from Yunnan, but through the tactics of the Burmese the force was practically annihilated. The Siamese were subject to the Burmese until 1771, when they revolted and were never again subdued, peace being concluded between the two powers in 1793. At this time the British and Burmese were gradually approximating, and occasional collisions occurred. These culminated in outrages committed by the Burmese, and in 1824 war was declared by England. An uneventful campaign ensued, in the course of which Sir A. Campbell triumphed over his foes at every point, and ultimately obtained from them the ratification of the treaty of Yandabu, ceding Arakan, with the provinces of Mergiu, Tavoy, and Yea; the renunciation by the Burmese sovereign of all claims upon Assam and the contiguous petty states, a war indemnity, and other concessions. The peace was, however, emphatically short-lived, and in 1852 a second Burmese war was declared which resulted in the annexation of the province of Pegu, by proclamation of the Governor-General, Lord Dalhousie. In 1855 a mission of compliment was sent by the ruler of Burma to the Viceroy, and in the summer of the same year Major Arthur Phayre, *de facto* governor of the new province of Pegu, was appointed envoy to the Burmese court, accompanied by the late Sir Henry (then Captain) Yule, and Dr. Oldham as geologist. This mission added largely to our knowledge of the country, but it was not till 1862 that the king yielded so far as to conclude a treaty of commerce. A British resident was, until October, 1879, maintained at the capital, and during that time two expeditions under Major Sladen and Colonel Horace Browne were despatched, in 1868 and 1874 respectively, towards the Chinese frontier. The latter expedition was marred by the assassination of Mr. Margary, who had been commissioned to meet the party from the Chinese side.

The last king of Burma, Theebaw, ascended the throne in 1878, and, in spite of remonstrances from Mr. R. B. Shaw, the British resident at Mandalay, massacred almost all the direct descendants of his predecessor in February, 1879. In October of the same year the British resident was withdrawn, and though efforts were made to re-open friendly relations, and a Burmese embassy visited Simla in 1882, there was no real restoration of confidence. British subjects and traders were molested, and representatives of France and Italy were welcomed, two return embassies being despatched from Burma to Europe. This behaviour culminated in an act of great oppression, whereby the Bombay Burma Trading Corporation, a company of merchants with dealings in Burma, were summarily condemned to pay a fine of £230,000 to the Burmese Government. The Chief Commissioner protested, and eventually despatched an ultimatum to Mandalay. On this being unconditionally rejected, British troops crossed the frontier on the 14th November, 1885. Except at Minhla, scarcely any resistance was encountered. The capital surrendered, the king and his two queens were sent down to Rangoon, and the Chief Commissioner assumed charge of the administration. On the 1st January, 1886, Upper Burma was declared to be part of Her Majesty's dominions, and it was afterwards formally incorporated with British India under Act 21 and 22 Vict., cap. 106. The subsequent history of Burma, but more especially Upper Burma, has been one of pacification and consolidation. For some time after the annexation the country was overrun by dacoit leaders and rebels, who maintained a sort of guerilla warfare, and whose example occasioned disturbances in Lower Burma as well. Constant expeditions have had to be despatched in various parts of the country, which is now gradually settling down. These pacificatory measures have also not been without their indirect advantages in enabling British officers to survey and open up the country. In 1898 a legislative council was constituted for Burma, and the province is now governed by a Lieutenant-Governor and a legislative council of nine nominated members (five official and four non-official).

Burmann, PIETER, the son of a theological professor, was born at Utrecht in 1668. He distinguished himself as a classical scholar and historian. In 1715 he obtained a professorship of history, eloquence and Greek at Leyden. He brought out famous editions of Horace, Ovid, Lucan, Phædrus, and other classics, indulged in original Latin poetry, and engaged in the bitter controversies that raged between the scholars of his day. He died in 1741. His nephew, Pieter Burmann, the younger, was also distinguished as a Latinist.

Burn, RICHARD, was born at Winton, Westmoreland, in 1720, and, taking holy orders, became vicar of Orton and justice of the peace. He devoted himself to a study of the laws which he had to administer, and was thus led to compile the digest for the use of magistrates and justices of the peace known as *Burn's Justice*. He also published a valuable compendium of ecclesiastical law, wrote part of the history of his native county, and served as chancellor of the diocese of Carlisle. He died in 1785.

Burnaby, FREDERICK GUSTAVUS, was born of an old and distinguished family in 1842. He obtained a commission in the Royal Horse Guards in 1859, and rose to be lieutenant-colonel in 1881. A man of restless energy, reckless daring, and eccentricity that occasionally defied the laws of common sense, he spent his long periods of leave in difficult and dangerous expeditions, chiefly in

South America or Central Africa. In 1875, stimulated by the accounts of Russian advances, he rode alone to Khiva, publishing a lively record of his adventures, which were cut short by the officers of the Czar. Next year found him exploring Asia Minor and Persia (*On Horseback through Asia*), but he ended it as correspondent of the *Times* with Don Carlos in Spain. He now took to politics and unsuccessfully contested Birmingham as a Conservative in 1880. Ballooning next occupied his attention, and in 1882 he crossed the Channel to France. In the service of the Intelligence department he took part in General Graham's operations against the Soudanese at Suakim in 1884, and was severely wounded at El Teb. He was not permitted to join the Nile expedition, but as a volunteer pushed on to the front late in the year and attached himself to General Herbert Stewart's column in its march from Korti to Metamneh. When the square was broken at Abu Klea by a charge of dervishes he exerted all his courage and his great personal strength to rally his comrades, and fighting in advance of the line was pierced by an Arab spear.

Burnand, Sir Francis Cowley, was born in 1837, educated at Eton and Trinity College, Cambridge, and destined for the bar. Though called in 1862, he never engaged in serious practice, but took to writing for the burlesque stage and the comic papers. In the former line he has produced *Ixion*, *Black-eyed Susan*, *Stage Dora*, and several other amusing travesties specially contrived for the display of Mr. Toole's talents. *Artful Cards*, *Betsy*, and *Miss Decima* are specimens of his skill as a borrower from the French. In journalism Burnand associated himself at the start with Mr. H. J. Byron, then editor of *Fun*. Presently he transferred his talents to *Punch*, and in 1880 succeeded Mr. Tom Taylor in the direction of that paper. Perhaps his best known contributions to its columns have been his parodies on modern novelists, somewhat overdone but full of keen observation and tempered satire, and the long series of papers entitled *Happy Thoughts*, in which the inner workings of the common-place mind are amusingly laid bare, and certain types of character and phases of social manners are hit off with playful dexterity. He resigned his position as editor in 1906, and was succeeded by Owen Seaman; he had discharged his task with great tact and good-nature. He was knighted in 1902.

Burne-Jones, Sir Edward, was born in 1833 and was a student at Exeter College, Oxford, when he came under the influence of the pre-Raphaelite movement, of which Gabriel Dante Rossetti and William Holman Hunt were the leaders. Mr. Burne-Jones became thoroughly imbued with two characteristics of the new school, a yearning for mystical and symbolical teachings of mediæval asceticism and a faithful appreciation of minute details both in form and colour. Few adhered so constantly to these first principles as he did. For some years he worked mainly in water-colours or tempera, and was regarded rather as an amateur, filling his mind meanwhile with legendary lore gathered from the classics, the lives of the saints, and the northern sagas. Among his more remarkable works in recent years were *The Days of Creation*, *Merlin and Vivien*, *The Mirror of Venus*, *Day and Night and the Four Seasons*, *Laus Veneris*, *Le Chant d'Amour*, *The Annunciation*, *Pygmalion*, *The Golden Stairs*, *The Wheel of Fortune*, *Cophetua and the Beggar Maid*, *The Depths of the Sea*, *The Mermaid*, *The Star of Bethlehem*, and several designs of a decorative character, such as those illustrating *The Myth of Perseus* and *The Legend of the Briar Rose*. He died in 1898.

Burnes, Sir Alexander, was born at Montrose in 1805, and entered the army of the East India Company at the age of seventeen. He soon attained such proficiency in Hindustani and Persian as to be appointed interpreter first at Surat and then at Cutch, where his attention was directed to the as yet imperfectly known regions in the north-west of India. In 1831 he was sent to Lahore with a present from William IV. to Runjit Singh, and he spent some two years in travels which led him into Afghanistan across the Hindu Kush range to Bokhara and Persia. The narrative which he published in 1834 brought him at once into notice. In 1835 he was instructed to procure at Sindh a treaty for the navigation of the Indus, and in 1836 was dispatched on a mission to Dost Mohammed at Cabul, where on the restoration of Shah Sujah in 1839 he became British resident. He refused to quit his post in the turbulent times that followed, and in November, 1841, was assassinated during an insurrection.

Burnet (*Poterium Sanguisorba*), a perennial rosaceous plant, common in dry pastures, especially on calcareous soil. It has an angular stem about a foot high, pinnate leaves of 11 to 21 serrate leaflets, with leafy stipules, and compact heads of monœcious flowers without petals. The upper flowers in the head are female, each having an exserted feathery ("penicillate") stigma; whilst each of the lower ones have 20 or 30 pendulous, exserted, pink stamens. As stigma and pollen mature at different times the plant is clearly adapted for wind-pollination. It was formerly eaten in salad, whence its name of "salad burnet," and its leaves, which taste like cucumber, were used in cool tankard, whence the Latin name *Poterium*, which means a drinking cup.

Burnet, Gilbert, was born in Edinburgh in 1643, being descended from an old Aberdeen family. He was at first educated at the Marischal College for his father's profession of the law, but soon took to divinity and was ordained at the age of eighteen. In 1663 he visited England, spending six months at Oxford and Cambridge, and he then made a stay of several months in Holland and France, where he imbibed broad principles of toleration from association with men of all creeds. On his return he was presented to the living of Saltoun, and in 1669 he obtained the professorship of divinity in the University of Glasgow. It was

then that he wrote his *Modest and Free Conference between a Conformist and a Nonconformist*, and began the *Memoirs of the Dukes of Hamilton*, which led to his being invited by Lauderdale to London. Here he remained as preacher at the Rolls chapel and lecturer at St. Clement's until the accession of James II., bringing out the first two volumes of his *History of the Reformation of the Church of England*, for which he received the thanks of Parliament. He travelled next in France, Holland and Switzerland, visiting also Rome, where he injudiciously mixed himself up in religious controversies. William of Orange attached him to his cause, and James thereupon prosecuted him for high treason. In 1688 he came over as the stadtholder's chaplain, and under the new *régime* obtained the bishopric of Salisbury. His moderation as much as his change of masters provoked strong animosities, and he was more than once violently attacked in Parliament, especially for his *Exposition of the Thirty-nine Articles*, published in 1699. His last efforts were devoted to the promotion of the Act for the augmentation of small livings, passed in the second year of Anne, and he died in 1715. The most famous of his works, *The History of his own Times*, was not printed till 1724, and then appeared in a mutilated form. It is a trustworthy and valuable record of contemporaneous events, though written, as might be expected, from his own point of view.

Burnet, JOHN, F.R.S., the son of the surveyor-general of excise for Scotland, was born in 1784, and was a fellow pupil of Wilkie at the Trustees' Academy in Edinburgh. Coming to London in 1806 he found employment in illustrating, as an engraver, Brayley's *England*, and Theobald's *British Theatre*, and in reproducing Wilkie's *Jew's Harp* and *Blind Fiddler*. From 1815 to 1820 he spent in Paris, and on his return worked for the association of engravers, and also for Wilkie. He was a painter of no mean ability, his best productions being *The Draught Players*, *The Humorous Ballad*, *The Windy Day*, and *Greenwich Hospital and Naval Heroes*, purchased by the Duke of Wellington. He wrote several treatises on art, and died in 1868.

Burnet, THOMAS, born at Croft, Yorkshire, in 1635, and educated first under Tillotson at Clare Hall, and then under Cudworth at Christ's College, Cambridge, after holding several academical offices and acting as tutor to the Dukes of Bolton and Ormonde, was elected (1685) master of the Charterhouse. He strenuously opposed the appointment by James II., in disregard of the statutes, of Andrew Popham as a pensioner of the house. Of his various works and tracts on theological subjects, mostly in Latin, the best known is *The Sacred Theory of the Earth*.

Burnet Moths, a group of moths, one species of which (*Zygæna filipendulæ*) is one of the most beautiful of English moths; the larva of this species feeds on the dropwort (*Spiræa filipendula*).

Burnett, FRANCES HODGSON, MRS., was born in Lancashire in 1849, her maiden name being Hodgson. Settling with her parents in Tennessee, U.S.A., about 1865, she began to contribute stories to the American magazines, and soon became a popular favourite. *Surly Tim* was one of her first republished efforts (1872). *That Lass o' Lowries'* (1877) was a still more decided success, and was followed by *Theo*, *Kathleen*, *Jael's Daughter*, *Louisiana*, *Sara Crewe*, *Little Lord Fauntleroy*, *Editha's Burglar*, *A Lady of Quality*, with its sequel, *His Grace the Duke of Osmonde*, *The Making of a Marchioness*, *The Dawn of a To-morrow* (1907), and several other tales and sketches. She married Dr. Burnett in 1873, and obtained a divorce from him in 1898, after which she married again. She now lives in Kent.

Burnett, JAMES. [MONBODDO.]

Burnett's Disinfecting Liquid consists of a solution of zinc chloride in water.

Burney, CHARLES, MUS. DOC., was born at Shrewsbury in 1726. He got a good early education at the grammar school there, and was then sent to Chester to learn the organ under Dr. Blow, subsequently being trained for three years by the famous Dr. Arne. For a short time he was organist at a City church, and wrote for Drury Lane theatre the music of *Robin Hood*, *Alfred*, and *Queen Mab*. In 1751 by medical advice he settled as organist at King's Lynn, where he remained nine years and married. Returning to London in 1760 he adapted Rousseau's *Le Devin du Village* for the English stage under the title of *The Coming Man*, and received a doctor's degree from the University of Oxford. He now devoted himself to a long cherished object, the writing of a complete history of music. In 1770 he travelled through France and Italy collecting materials, and his book on *The Present State of Music* in those countries won Dr. Johnson's approbation. In 1772 he did the same for Germany, the Netherlands, and the United Provinces, and was elected F.R.S. The first volume of his great work, *The History of Music*, appeared in 1776, and it was completed in 1789. Defective in certain parts, and severely treated by foreign critics, it testifies to unflagging industry and wide knowledge. In 1789, through Burke's influence, he was appointed organist at Chelsea Hospital, where he died in 1814. He wrote a *Life of Handel* and *Memoirs of Metastasio*, and composed many sonatas and concertos. His second daughter, FRANCES [D'ARBLAY], attained great fame as a novelist; his eldest son, JAMES, became a distinguished admiral, and another son, CHARLES, was a fine classical scholar, whose library now forms part of the collection in the British Museum.

Burney, FRANCES. [D'ARBLAY.]

Burnham Beeches, a tract of forest extending over some 600 acres in the parish of Burnham, Bucks, about 3 miles N.E. of Maidenhead. It is supposed to date from pre-Roman times, and certainly contains some of the finest and oldest specimens of the common beech to be found in England. The property is now held in trust by the Corporation of London for public use.

Burning. [COMBUSTION.]

Burnley, a municipal and parliamentary borough, returning one member, in Lancashire, 24 miles N. of Manchester, on the river Burn. The church of St. Peter is ancient but modernised, and there are a curious Saxon cross and many Roman remains. The modern public buildings are commodious, and the streets well paved and lighted. The chief industries are the manufacture of woollen and cotton goods and machinery, with calico-printing, brewing, and tanning. It is on the Lancashire and Yorkshire Railway. Pop. (est. 1908), 105,100.

Burnouf, EUGENE, the son of Jean Louis Burnouf, an eminent classical scholar, was born at Paris in 1801. He devoted himself to Oriental studies, and in 1826 brought out his *Essai sur le Pali*. The newly-discovered Zend manuscripts next claimed his attention, and he published the *Vendidad Sadé* and his *Commentaires sur le Yaçna* between 1829 and 1843. Meanwhile he had been appointed professor of Sanscrit in the Collège de France, and in 1840 began to bring out the text of the *Bhagavata Purana* with a translation. His last works were *Introduction à l'Histoire du Bouddhisme Indien*, and *Le Lotus de la Bonne Loi*. He died in 1852.

Burns and Scalds, a form of injury always most painful and distressing, and not uncommonly fatal, particularly in the case of young children. The danger of a burn is always greater in the young than in adults. It also varies with the extent of surface involved, and the depth to which the mischief penetrates. Burns have been divided by Dupuytren into six degrees according to their depth, as follows:—

(i) When the epidermis is merely scorched and reddened, but not separated from the true skin.

(ii) When the epidermis is raised, forming blisters.

(iii) When the true skin is involved, but not completely destroyed.

(iv) When the true skin is completely destroyed. In this and in the two following degrees the question of the contraction of scar tissue on healing becomes one of much importance.

(v) Where the muscles, etc., are involved.

(vi) Where the whole limb is implicated down to the bone.

The symptoms of a severe burn are grouped under three stages. The first is the stage of collapse with low temperature and feeble pulse; then, after about two days, comes the stage of reaction, with inflammatory fever. Pleurisy or peritonitis may now declare themselves, and the burnt surface undergoes suppuration and smells offensively. The third stage is that of exhaustion.

A curious and unexplained sequel of burns is ulceration of the intestinal mucous membrane, and particularly of the duodenum.

If the clothes of a child catch fire the most ready way of putting out the flame is to smother it by enveloping the child in a hearthrug, table-cloth, or whatever can be seized upon to wrap round the burning part. The greatest care is necessary in removing clothing from the areas involved in a burn; the clothes should be cut away with scissors, and when the injured skin is exposed, cold applications should, as a rule, be applied. Carron oil, consisting of equal parts of limewater and linseed oil, is a capital form of local application; olive oil makes a very fair substitute, or some simple ointment may be used, or, if the burn is superficial, a little flour may be dusted over it. After a few days, if the injured skin tends to slough, antiseptic applications must be employed. In all cases of burns of any extent in children, medical advice should be procured without delay.

Burns, RIGHT HON. JOHN (b. 1858), attracted attention in 1886 by his part in the London dock strike; in 1887 he was imprisoned for six weeks for resisting the police in connection with the Trafalgar Square riots. He was a prominent member of the London County Council, and became M.P. for Battersea in 1892. President of the Local Government Board (1905), and after the General Election in 1910 retained office.

Burns, ROBERT, born 1759, was the son of William Burns, a small farmer. In the year 1766 William Burns became tenant of the farm of Mt. Oliphant in the same district, and here were passed the later boyhood and youth of the poet. Here a private tutor gave Robert Burns most of his elementary education. The family rented the farm of Lochlea from 1777 to 1784, and here Burns composed his first verses. One of the best of his songs, *Mary Morrison*, written in honour of Ellison Begbie, dates from this period. About 1781 he had seriously thought of becoming a flax-dresser, and went to Irvine to acquire a knowledge of the business, but without result. The last year of the lease at Lochlea saw the death of Burns's father. In March, 1784, he and his brother Gilbert became tenants of Mossgiel. Two unprofitable harvests, however, on his beginning life at Mossgiel at once depressed his impulsive nature. He now first became less prudent in social life. In poetry this found expression in satirical attacks on the minister and other leaders of the church with which he was connected. The most bitter of these were *The Holy Fair* and *Holy Willie's Prayer*. The favourable reception given to the ability and skill of composition in these and other pieces deepened the consciousness Burns had of his own power. In his commonplace book of August, 1784, we find an entry in regard to Ramsay and Fergusson, and the expression of his own simple wish that he may yet sing the "romantic woodlands" of Ayr. The wish was speedily to be fulfilled. Burns about this time produced some of his very best longer poems, the *Cotter's Saturday Night*, *The Jolly Beggars*, *Hallowe'en*, *The Mountain Daisy*, and others. Early in 1786 he went through a form of marriage with Jean Armour. To the same period belongs the pathetic love episode with Mary Campbell, the *Highland Mary* of two beautiful songs. In April of this year the publication of Burns's poems was resolved on by his friends for the sake of his poetical reputation, by himself principally to get a few pounds wherewith to emigrate to Jamaica. In July the volume was issued by subscription from the press at Kilmarnock. The popularity of the book was unbounded, and Burns

himself was sought after on all hands. His passage to the West Indies was cancelled, and finally he set out for Edinburgh to let himself become better known in the world of letters.

In Edinburgh Burns at once became the rage; he was courted by the nobility, literary coteries, and social clubs. The litterateurs of the period, Robertson the historian, Dr. Hugh Blair, and others, were charmed by the rare personality of the poet. The excellence of his powers of conversation impressed everyone. His genius in poetry was extolled in the *Lounger*, a critical journal. After the publication of a second edition of his poems, Burns, accompanied by his friend Robert Ainslie, went on tours through the border country and the Highlands. He was now engaged in writing songs for Johnson's *Museum*, a work that was really the means of developing his purely lyrical gift. Most of his contributions were marked by his peculiar power. They were of three kinds: sometimes an old song with some lines added; sometimes only a line might be old; again, they were altogether original. Two of the most famous—*Auld Lang Syne* and *John Anderson*—belong to the second of these divisions. The profits on the sale of the second edition of his book enabled him to lease the farm of Ellisland, near Dumfries. There he settled with his wife in 1789. In the same year he was appointed exciseman for his district. His conduct of this office, though generally precise, is marked by some humorous incidents. The summer of 1789 is memorable for a holiday visit to his friend Nicol, in Moffatdale, as a result of which he wrote *Willie Brewed a Peck o' Maut*. In addition to songs for the *Museum*, he now meditated a drama on the subject of Robert Bruce, but it came to nothing. In 1790 he produced *Tam o' Shanter*, at the suggestion of Captain Grose, who wished some letterpress, for an illustration by himself, of Alloway Kirk. One of his crowning efforts in the lyrical vein—*The Banks o' Doon*—was published in the winter of 1791. His popularity was now at its zenith, but misfortune soon fell upon him. He was forced by poor returns to leave Ellisland. His social excesses alienated some of his best friends; his cordial but injudicious sympathy with the French republic embroiled him with the Government, who threatened to cancel his appointment in the Excise. Burns outwardly acquiesced in the rebuke he received on this second head, though he appears to have felt strongly on the subject. No doubt, as is thought by some, we partly owe to that sympathy two of his most virile compositions—*Scots Wha Hae* and *A Man's a man for a' that*. The prospect of a supervisorship of excise at Leith came before him in 1796, but he never received it. Burns was prostrated with rheumatic fever in the autumn of 1795, and his constitution was fatally shaken. After a good deal of suffering, he died on July 21, 1796.

Beugo's engraving of Nasmyth's portrait of Burns was the picture of him most esteemed by his friends. The completest editions of his poems and correspondence are those by Scott Douglas and R. Chambers (new ed. by William Wallace). Among numerous biographies, Lockhart's excels in insight and accuracy. Of critical estimates, those by Carlyle, Blackie, and Henley are the best. The greatness of Burns rests mainly on his songs; these, by their fresh and transparent sentiment, their rich mingling of human passion with delight in external nature, and their apt and musical diction, hold a place above the work of any other lyrist. As a narrative poet he also ranks high. His *Cotter's Saturday Night* is an idyll of true classical restraint; his *Tam O'Shanter* is to be placed beside the creations of Shakespeare and Scott. The satire of his occasional poems is brilliant, keen, and unsparing. Everywhere Burns displays generous views of society; if he was preceded by Cowper in proclaiming a spirit of humaneness, he was the first British poet to insist on that of brotherhood.

Burnside, AMBROSE EVERETT, was born at Liberty, Indiana, U.S.A., in 1824, and graduated at the Military College, West Point, in 1847. He served as a cavalry officer in Mexico and New Mexico, seeing a little fighting against the Apaches, but in 1853 left the army and ultimately became treasurer of the Illinois Central Railway. At the outbreak of the Civil war he was colonel of volunteers, and in 1861 commanded a brigade on the Federal side at Bull river. He next assisted McClellan in organising his army, and early in 1862 directed the expedition which captured Roanoke Island, and he also took Newbern and other positions. As a major-general he joined McClellan on the James river, and took part in the battles of South Mountain and Antietam. At the end of 1862 he succeeded McClellan in the command of the army of the Potomac, and made a disastrous attack on Lee near Fredericksburg, after which he resigned. However, in the spring of 1863 he was once more in command in Ohio, whence he marched into East Tennessee and held Knoxville against Longstreet. In 1864 he was entrusted with the 9th corps under Grant and fought in all the chief engagements until Lee's surrender. From 1866 to 1871 he was Governor of Rhode Island, and in 1875 was elected to the Senate. He died in 1881.

Burnt-offering. [SACRIFICE.]

Burnt Sienna, a pigment obtained by heating "terra da Sienna," an earthy substance found in Tuscany, which contains a considerable amount of oxide of iron, to which the pigment owes its colour. It gives a warm reddish brown, and being permanent, is largely used for oils and water-colours.

Burr, AARON, a grandson of the famous Jonathan Edwards, was born at Newark, New Jersey, U.S.A., in 1756, and entering the army at the age of twenty-one served in the Quebec expedition and elsewhere until 1779, when he retired and took to the legal profession. In 1800, having previously filled many high offices and been chosen senator, he stood as a democrat with Jefferson for the presidency and vice-presidency. They got an equal number of votes, and Burr lost popularity in a vain effort to take precedence over his ally. In 1804, being candidate for the governorship

of New York, he challenged one of his opponents, General Hamilton, and killed him in a duel. He was obliged to vacate his appointments, and in 1807 was charged with a treasonable conspiracy to establish an independent government in the south-west. He fled to Europe, but returning in 1812 he practised as a lawyer in New York and died in 1836.

Burriana, a town in the province of Castellon de la Plana, Spain, situated on the left bank of the Rio Seco, about a mile from the Mediterranean. The chief industry is fishing.

Burritt, ELIHU, the son of a village schoolmaster, was born at New Britain, Connecticut, U.S.A., in 1810. Apprenticed to a blacksmith, he worked at the trade for several years, teaching himself Latin and French in his leisure moments. He also acquired nearly all the modern languages, with Hebrew, Syriac, and Greek, while still pursuing his craft. In 1842 he added Persian, Turkish and Ethiopic to his repertory. He very strongly advocated an ocean penny postage, and tried to establish a "League of Universal Brotherhood." His two most popular books were entitled *Sparks from the Anvil* and *Thoughts on Things at Home and Abroad.* He lived for many years in England, and died in 1879.

Burroughes, JEREMIAH, born in 1596 and educated at Cambridge, was expelled thence for nonconformity. He was for some time pastor of an English church at Rotterdam, but in 1642 returned and had charge of large congregations at Stepney and Cripplegate. He wrote several theological works, among them being an *Exposition of Hosea.* He died in 1646.

Burrus, AFRANIUS. Sole commander (in the time of Claudius, q.v., 52 A.D.) of the Prætorian guards, and in 54 A.D. secured the accession to the Roman throne of Nero, who had been his pupil. Notwithstanding, in 62 A.D., he was put to death by Nero (q.v.).

Bursa, a sac containing fluid interspersed between a tendon and the surface over which it glides; or lying beneath the skin covering some long prominence. Bursæ of the former class are called *synovial bursæ*, and when situated in the neighbourhood of a joint they frequently communicate with the joint cavity. The other variety of bursa is the *bursa mucosa*, an example of which is the *bursa patellæ*, or the bursa situated over the olecranon process of the elbow. Bursæ are liable to enlargement under the influence of pressure. A familiar example of such a condition is the enlarged bursa patellæ produced by kneeling, and causing the condition known as housemaid's knee, a trouble of an allied nature sometimes developed in miners—the miner's elbow—being due to enlargement of the bursa over the olecranon process. Suppuration may occur in the sac of an enlarged bursa producing a bursal abscess. [GANGLION, BUNION, and HOUSEMAID'S KNEE.]

Bursary, a term applied in Scotland to a sum of money obtained by a student at one of the colleges or universities, by competitive examination, enabling the holder to pursue his studies for a certain number of years. It is equivalent to the English scholarship.

Burschenschaft (German, *bursch*, a student), an association of students: the name being specially applied to one founded in 1813, at Jena. Its members were students who had fought in the war, and who had cherished ideas of German national unity. In 1819 the club was broken up by the government.

Burslem, a municipal borough of Staffordshire on the North Staffordshire Railway, three miles from Newcastle-under-Lyne, and in the midst of the pottery district. It has been famous for the manufacture of earthenware since the 17th century, but was in existence when Domesday Book was compiled. Among the public buildings is the Wedgwood Institute (1863), a sort of technical school of fictile art, and in its structure a monument of its progress. Pop. (1901), 38,766.

Burton, JOHN HILL, born at Aberdeen in 1809, and educated at the Marischal College, was called to the Scottish bar in 1831. Whilst exercising his profession and holding several appointments in connection with the Prisons Boards, he wrote articles in the *Westminster* and *Edinburgh Reviews*, and ultimately devoted himself to literature, becoming historiographer-royal in Scotland. His most valuable works are *Benthamiana*, *The Book Hunter*, *Scots Abroad*, *Life and Correspondence of David Hume*, *History of Scotland from Agricola's Invasion to* 1688, and *History of Scotland from the Revolution to the Extinction of the Jacobite Insurrection.* He died in 1881.

Burton, SIR RICHARD FRANCIS, KNT., was born at Barham House, Hertfordshire in 1821, and being destined for the Church, matriculated at Oxford. He soon abandoned an uncongenial career, and in 1842 entered the Bombay native infantry. He served in Scinde and elsewhere, devoting much attention to native languages, until 1851, when he went home on leave. He now formed the idea of visiting Mecca and Medina as a Mohammedan pilgrim, and with that object lived in Alexandria as a dervish for some time, making his way at last without molestation to the holy cities. His adventures were related in *A Pilgrimage to El Medinah and Mecca.* He next visited the east coast of Africa, and served on General Beatson's staff in the Crimea. In 1856 in the company of Captain Speke he set out from Zanzibar into Central Africa, and after two years' travelling discovered Lake Tanganyika. The Mormon settlements in Utah then attracted his curiosity, and in 1861 he brought out *The City of the Saints* before taking up his residence as consul at Fernando Po. Here he explored the Cameroon mountains and some of the inland districts, which he described in two volumes. He was transferred to Brazil in 1864 and wrote *Exploration of the Highlands of Brazil* and in 1868, being sent to Damascus, produced an interesting work on *Unexplored Palestine.* In 1872 he was established in the consulate at Trieste, and no further promotion awaited him. During various

periods of leave he explored with Captain Cameron the gold regions of Western Africa, and paid several visits to Arabia. His late years were occupied also with purely literary labours such as his monograph on Camoens, his *Book of the Sword*, and his daringly exact translation of the *Arabian Nights*. Burton, besides the distinction of knighthood, received numberless marks of recognition from learned societies at home and abroad, but it must be admitted that his great services to science were but scantily rewarded by Government. One consolation for his disappointments was vouchsafed to him in his singularly happy marriage with a lady who thoroughly sympathised with his aims and bravely shared the hardships of his restless, adventurous career. After many months of broken health he died at Trieste in 1890, and was buried at Mortlake with the rites of the Roman Church.

Burton, ROBERT, was born at Lindley, Leicestershire, in 1576, and graduated at Brasenose College, Oxford, being elected later student of Christchurch. Very few details of his life are known to us beyond the fact that he received the college living of St. Thomas, Oxford, in 1616, and in 1636 held also the rectory of Segrave. According to Anthony Wood, he led a silent and solitary existence at Oxford, reading a great variety of books, and enjoying some reputation as a scholar, a mathematician and a caster of nativities. In 1621 under the pseudonym, Democritus Junior, he let loose his marvellous stores of learning and his vein of quaint, satirical and occasionally malicious humour in the famous work entitled *The Anatomy of Melancholy*. The author was no doubt himself a prey to the strange physical and moral disorder that spread like an epidemic in the Elizabethan period, and he very probably found relief in the incessant industry to which his book bears witness. It is a mine of quotations from every field of literature, familiar or remote, and it has been freely drawn upon by later writers. Burton's own portion of the book is rugged in style, but not without a certain flavour of wit, and the poem that serves as an introduction reminds the reader of *Il Penseroso*. He died in 1639 and was buried in Christ Church cathedral.

Burton-on-Trent, an ancient town of Staffordshire, twenty-five miles from Stafford on the west bank of the river Trent, navigable to this point, and having communication with the Midland, North-Western, and North Staffordshire Railways. The origin of the place was a church or monastery founded in the 9th century, and Burton Abbey dates from 1002. The bridge across the river, reconstructed in 1864, was built about the same time. It has a town hall, a free grammar-school, and other institutions. The peculiar suitability of the water for brewing purposes owing to the large amount of sulphate of lime it contains, led to the establishment of breweries there about 1708, and an export trade began forty years later. About the year 1823 pale ale and bitter beer were first specially made for Indian consumption, and by a mere accident they were introduced with great success into the home market. From this period started the prosperity of such great houses as Bass and others, whose business grew to be worth several millions a year. Pop. (1901), 50,386.

Burtscheid, or BORCETTE, a town in Rhenish Prussia, forming a suburb of Aix-la-Chapelle. It stands on the sloping bank of the Worm-fluss, and is famous for its mineral springs impregnated with sulphur and other minerals. The temperature of one of them is 155° F. There are manufactories of woollen textures, Prussian blue, cast-iron goods, and machinery. It grew up around a Benedictine monastery founded in the tenth century.

Buru, an island of the Malay archipelago belonging to the residency of Amboyna. It occupies an area of about 3,500 square miles, and is for the most part mountainous and covered with forests.

Bury, a municipal and parliamentary borough of England, in Lancashire, is situated on the Irwell, eight miles from Manchester. Its chief manufacture is cotton. It has also large woollen factories, bleach-fields, dye-works, and foundries, and in the neighbourhood are freestone quarries and coal mines. Sir Robert Peel was born here. Pop. (1901), 58,028.

Buryat (or BURIAT), Mongols of South Siberia, of whom there are eleven main divisions, four E. and seven W. of Lake Baikal, their whole domain extending from the head-streams of the Tunguska to the confluence of the Shilka and Argun. They call themselves Hunn, *i.e.* "men," and are traditionally a branch of the Kalmucks (West Mongolians), but since the twelfth century settled in their present homes. Those of the Irkutsk are still Shamanists, the rest Buddhists; their speech is a Mongolian dialect, of which G. Balinth has published a grammar and vocabulary (Pesth, 1877). All are stock-breeders. They are gradually decreasing, and now number about 200,000.

Burying-beetle. [NECROPHORUS, SILPHIDÆ.]

Bury St. Edmund's, or ST. EDMUNDSBURY, a parliamentary and municipal borough of England, in Suffolk, is situated on the river Larke. It is a very ancient place, and was named from Edmund, the Saxon king and martyr, who was taken prisoner and put to death by the Danes in 870. There are remains of a Benedictine Abbey founded by Canute, and a celebrated grammar school founded by Edward VI., and free to the natives. Besides a trade in agricultural produce, there are extensive manufactures of agricultural implements. In the vicinity is Ickworth, the seat of the Marquis of Bristol. Pop. (1901), 16,255.

Busaco, a mountain ridge in the province of Beira, Portugal, was the scene of a battle between Wellington and Massena, September 27th, 1810. Wellington, with 40,000 British and foreign troops, repulsed Massena with 65,000 French troops, and continued his retreat to the lines of Torres Vedras.

Busby, RICHARD, schoolmaster, was born in 1606 at Lutton, Lincolnshire. In 1640 he became head master of Westminster School, and such was his success that at one time no fewer than sixteen bishops sat on the bench who, in his own words,

had been "birched with his little rod." Among the names of his pupils are those of Dryden, Locke, Prior, and South. He died in 1695, and was buried in Westminster Abbey, where his effigy still remains.

Büsching, ANTON FRIEDRICH, geographer, was born in 1724 at Stadthagen in Schaumburg-Lippe. It was while on a journey to St. Petersburg that he became sensible of the incomplete state of geography, and resolved to do what he could to improve it. After occupying the chair of philosophy at Göttingen, he accepted an invitation to become pastor of the Protestant congregation at St. Petersburg in 1761. In 1765 he returned to Germany and became head of the Greyfriars Gymnasium, founded by Frederick the Great, at Berlin, where he died in 1793. His *Neue Erdbeschreibung* was the first geographical work of any scientific merit, and has been translated into most European languages. He also wrote theological treatises and valuable works on education. He is frequently cited by Carlyle in his *Frederick the Great* as a keen and reliable observer.

Busembaum, HERMANN, theologian, was born in 1600 at Nottelen, Westphalia. He occupied positions in various educational institutions of the Jesuits, and wrote *Medulla Theologiæ Moralis* (1645), for long a standard authority in the seminaries of his Order, and so popular that it went through upwards of fifty editions. Ultimately, by order of the Toulouse parliament, it was burned, on the ground that it favoured regicide. Busembaum died in 1668.

Bush Buck, a name for any antelope of the genus Cephalophus, which includes several species from tropical and Southern Africa, generally known to hunters as Duykers or Bush-goats. The horns of the males are short, straight, and conical; the tear-pit is reduced to a mere line; the muffle is broad, and, like that of the ox, always moist; the back is arched, the forehead convex in most species, the tail short, and the slender legs are terminated by minute hoofs. The coloration is uniform reddish-brown, slate-grey, or dull black. [BLAUBOK, DUYKER-BOK, GUEVEI.]

Bushel, a British dry measure, consisting of eight gallons. The imperial bushel of water weighs 80 lbs., and has a capacity of 2,218 cubic inches.

Bushire, or ABUSCHEHR (*The Father of Cities*), the chief seaport of Persia, in the province of Fars, is situated on the Persian Gulf. The surrounding country is of an uninviting nature, the climate excessively hot, and the water bad. The importance of Bushire depends altogether upon its trade, which is conducted mainly with India and Britain. Its imports embrace rice, indigo, sugar, cottons, steel, porcelain, bullion; and its exports raw silk, wool, shawls, horses, carpets, fruit, turquoises, gall-nuts, etc. The anchorage, though indifferent, is the best on the coast.

Bushmen (Dutch, BOSJESMANS), a term applied by the Europeans to the dwarfish aborigines of South-West Africa, who call themselves Khwai, *i.e.* "Men," and who are called Saan-qua (Soan-qua, San-qua) by their Hottentot neighbours and kinsmen. They appear to represent the primitive population of the whole of South Africa as far north as the Zambesi, whence they have been gradually driven to their present domain (the arid steppes of Great Bushman Land, south of the Orange river and the Kalahari Desert, north of that river) by the Bantu peoples advancing southwards from the interior of the continent. In some of their physical characters as well as in their speech, they resemble the Hottentots, of whom some regard them as a degraded branch, while others consider the Hottentots a mixed race, resulting from alliances between the Bantus and the Bushmen. Either view would satisfy many of the actual conditions, though it is probable that they have suffered degradation in their present environment, where they find little to live upon except game, snakes, lizards, termites, locusts, roots, bulbs, and berries. At times they pass four or five days in search of food, and then gorge themselves on the prey, five persons devouring a whole quagga or zebra in a couple of hours. Their weapons are the bow and poisoned arrow; their costume the undressed skins of wild beasts when procurable; their dwellings either the cave or a kind of "nest," formed by bending round the foliage of the *bosje* ("bush"), whence their Dutch name. They are grouped in small bands without any chiefs, and with scarcely any family ties, unions being of the most transitory nature. Yet debased as they are almost to the lowest level of culture compatible with existence, the Bushmen possess a sense of art far higher than that of the surrounding peoples, as shown by the paintings of animals true to life found in their caves. They have also a rich, oral folk-lore literature, consisting of legends, fables, and animal stories, in which the animals are made to talk each with its proper *click*, not otherwise heard in ordinary Bushman speech. These clicks, inarticulate sounds unpronounceable by Europeans, are peculiar to the Bushman and Hottentot languages, the former possessing six, the latter four; of these three have been borrowed by the Zulu Kaffirs, who have been for many generations in close contact with both of these primitive races.

Bushnell, HORACE, theologian, was born in 1802 in Connecticut, U.S. Educated at Yale College, where in 1829 he became a tutor, he was in 1833 chosen pastor to a Congregational church at Hartford. Various pamphlets and addresses drew upon him some popularity, and for his *God in Christ* (1849), with an introductory *Dissertation on Language as related to Thought*, he was tried for heresy, but acquitted by seventeen votes to three. He wrote numerous other theological works; among them *Sermons for the New Life*, *Nature and the Supernatural*, *The Vicarious Sacrifice grounded on Principles of Universal Obligation*, and *Moral Uses of Dark Things*. In 1857 he resigned his charge at Hartford, and without becoming again attached to any settled congregation, diligently employed the remainder of his life, which ended in 1876, as a preacher and an author.

Bush-rangers, the name given to robbers in Australia who have taken to the bush. At one

time their exploits were crowned with success, and they practically paralysed the police system. Stringent laws, however, did much to reduce their numbers, and at the present time they are practically extinct.

Bush Shrike, any bird of the sub-family Thamnophilinæ of the family Formicariidæ (sometimes called American Ant-thrushes) from Equatorial America. They resemble the shrike (q.v.) in habit, but, unlike that bird, they frequent the interior of bushes and thickets rather than the outside.

Bush Wren, any species of Pteroptochidæ, wren-like birds, chiefly from temperate South America. [BARKING BIRD.]

Busk, a strip of steel or whalebone inserted in a corset (q.v.) to stiffen it; hence the corset itself.

Bustard, any bird of the genus Otis, typical of the family, Otididæ [GRALLÆ], found in open tracts over the eastern hemisphere, except in Madagascar and the islands of the Malay Archipelago. The species have the bill straight, with the point of the upper mandible rounded; the nostrils oval, lateral, the legs long and naked above the tarsal joint; the three toes united at the base, directed forwards,

GREAT BUSTARD (*Otis tarda*).

and edged with membrane; the wings of moderate length, and rounded in a slight degree. The general form somewhat resembles that of a very large domestic fowl. These birds live in small companies, and feed on vegetables, seeds, insects, and worms. They run with great rapidity, using their wings, like Cursorial birds (with which they were formerly classed), to increase their speed, and flying low when forced to take wing. The males are polygamous, and the nest is extremely simple, sometimes a mere hole or depression in the ground. *Otis tarda*, the Great Bustard, from the plains of Europe and the steppes of Tartary, is rather more than three feet in length, weighs nearly thirty pounds, female much smaller; head and upper part of neck greyish-white, patch of slaty blue bare skin on side of neck, partly hidden in the breeding season by a long moustache of wiry feathers on each side; upper surface pale chestnut barred with black; reddish orange on upper part of breast, rest of under-surface white. The gular pouch appears to be only a dilatable part of the œsophagus, greatly inflated during the show off of the males. The flesh is much esteemed for the table. This bird was formerly a native of Britain, inhabiting the downs of Wiltshire, the Fen country, Norfolk, and the Yorkshire moors. The last known specimen of the wild race was killed near Swaffham in 1838, and is now in the Norwich museum. Many visitors, however, are recorded from time to time. *O. tetrax*, the Little Bustard, from the south of Europe and North Africa, is an accidental visitor, generally in the winter. There are several other Bustards inhabiting Asia and Africa, the largest of which is *O. kori*, from South Africa. It stands upwards of five feet high, and is the "wild peacock" of the Dutch settlers.

Butane. A hydrocarbon of the paraffin series, and of the composition C_4H_{10}. By replacement of one atom of hydrogen, *butyl* compounds are formed, all containing the group C_4H_9, *e.g.* butyl alcohol, C_4H_9OH. This may be written $C_3H_7OH_2OH$, which shows its relation to its oxidation product C_3H_7COOH, *Butyric acid*, which is found in sweat, in different plants, in milk, and is produced by the fermentation of sugar induced by putrid cheese.

Butcher Bird, a popular name for any of the Lanidæ, from their fierce nature and habit of killing more prey than they can eat at once. [SHRIKE.]

Butcher's-broom, or KNEE-HOLLY (*Ruscus aculeatus*), the only British monocotyledon with a woody stem. It belongs to the tribe Asparagineæ of the order Liliaceæ, and has a stout rhizome from which rise its much-branched, green, erect, angular stems, about as high as one's knee. Its numerous ultimate branches are cladodes (q.v.), or flattened and leaf-like, though leathery and springing from the axils of minute scale-leaves, and each ends in a spine. The flowers, which are sub-diœcious, spring from the upper surface of the cladodes, having small, greenish perianths of six leaves. The filaments of the stamens are united into a tube, and their anthers join alternately by their upper and lower ends, whilst the three-chambered ovary is enclosed in a barren staminodal tube, and forms a red berry-like fruit. This and the spinous branches give the plant some resemblance to a holly, and in some parts of the south of England, where it occurs in a wild state in woods, it is still used as a broom by butchers. Other species are *R. racemosus*, the Alexandrian laurel, with glossy spineless cladodes and a terminal raceme of flowers; *R. androgynus*, of the Canaries, with flowers on the margin of the cladode; *R. Hypophyllum*, with them on its under-surface; and *R. Hypoglossum*, with them between it and a similar flattened branchlet produced from its upper surface.

Bute, an island of Scotland, in the Firth of Clyde, forms with the islands of Arran, Great and Little Cumbræ, Inchmarnock, and Pladda, the

county of Bute, covering an area of 225 square miles. The island is about sixteen miles long, and from three to five miles broad, and is separated from the Argyllshire coast by a narrow winding channel, the Kyles of Bute. The northern part is mountainous and rugged, but elsewhere the soil is fertile and agriculture in an advanced stage. The chief town is Rothesay, whose castle is among the most interesting of the antiquities of the island. Mountstuart is the seat of the Marquis of Bute, to whom the greater part of the island belongs. The climate is milder than in any other part of Scotland.

Bute, JOHN STUART, third Earl of, statesman, was born in 1713. After being educated at Eton, he was in 1738 appointed a lord of the bedchamber to Frederick, Prince of Wales, the father of George III. After the Prince's death he became Groom of the Stole to George III., over whom he exercised great influence. In 1761 he was appointed Secretary of State, and in the following year became Prime Minister from May 29, 1762, to April 8, 1763. This brief government proved one of the most unpopular, its leading idea being the supremacy of the king. On his resignation Bute retired into private life, and devoted himself to literature and science, particularly to botany. He married the only daughter of Lady Mary Wortley Montagu, through whom the Wortley estates came into the Bute family. He died in 1792.

Butler, BENJAMIN FRANKLIN, American lawyer and politician, was born in 1818 at Deerfield, New Hampshire. He became noted as a criminal lawyer after being admitted to the bar in 1840, and in 1853 took a prominent part in politics on the side of the democrats. On the breaking out of the war in 1861 he was made a major-general of volunteers, and in 1862 led an expedition against New Orleans, of which city he became governor. The harshness of his rule caused much indignation, and earned for him the title of "Butler the Beast." In 1866 he represented Massachusetts in Congress, and in 1882 was elected governor of that state. He died in 1893.

Butler, ELIZABETH, LADY, painter, was born about 1843 at Lausanne. As Miss Thompson, she earned a reputation as a painter of military subjects. Her first academy picture was *Missing*, 1873, followed by the *Roll Call*, 1874, *Balaclava* and *Inkermann*, *The Defence of Rorke's Drift*, *The Scots Greys at Waterloo*, *Rescue of the Wounded* (1905), *A Cistercian Shepherd* (1908), &c. In 1903 she wrote *Letters from the Holy Land*. In 1877 she married SIR WILLIAM FRANCIS BUTLER (q.v.).

Butler, GEORGE, was born in 1774 in Chelsea. Head master of Harrow from 1805 to 1829, he became rector of Gayton, Northamptonshire, and in 1842 Dean of Peterborough. He died in 1853.

Butler, JOSEPH, English divine, was born in 1692 at Wantage, Berkshire. Though brought up a Dissenter, he yet joined the Church, taking orders in 1718. He was the appointed preacher at the Rolls Chapel, where he preached the sermons which he subsequently published in 1726 and which still hold a high place in moral science. After a period spent in retirement as rector of Stanhope, Durham, where he is believed to have written his *Analogy*, he was in 1733 appointed chaplain to Lord Chancellor Talbot, in 1736 a prebendary of Rochester, in 1738 Bishop of Bristol, in 1740 Dean of St. Paul's, and in 1750 Bishop of Durham. His great work, the *Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature*, was published in 1736. He died in 1752 at Bath, and was buried in Bristol cathedral.

Butler, SAMUEL, satirist, was born in 1612 in Worcestershire. After occupying various secretarial positions to people of influence, among them Sir Samuel Luke, a Puritan colonel of Bedfordshire, and supposed to be the original Hudibras, he published the first part of *Hudibras* in 1663. It became immediately popular, and Charles II. himself is reported to have been continually quoting it. A second part came out in 1664 and a third in 1678. Two years later Butler died of consumption and in poverty.

Butler, GENERAL SIR WILLIAM FRANCIS, distinguished soldier (1838–1910). He served in the Ashanti, Zulu, and Egyptian wars, and was in command of the troops in S. Africa from Dec., 1898, to Aug. 1899. He was then recalled and given command of the Western District, which he held until 1905. He wrote several books, amongst them a *Life of Sir G. Colley* (1899) and *From Naboth's Vineyard* (1907).

Butomus umbellatus, the so-called Flowering Rush, the only species of the genus, and one of the most beautiful English water-plants. It often grows in deep water, having a starchy rhizome, which is roasted and eaten in some parts of Asia. Its leaves are narrow, three-edged, filled with large air spaces, and several feet long, but are overtopped by the stout cylindric peduncle which bears an umbel. The flowers are an inch across, with a rosy perianth of six leaves, nine stamens, and six carpels. The stamens are hypogynous, six being due to the collateral chorisis of three outer ones. The fruit is a ring of six follicles.

Butt, ISAAC, politician, was born in 1813 in Donegal county. Called to the bar in 1838, he acquired a great reputation as a lawyer, receiving the silk gown in 1844. In 1852 he entered Parliament, as a Conservative, as member for Youghal, which constituency he represented till 1865. Meanwhile his political views were undergoing a change, and in 1871, when he was returned for Limerick, he became leader of the Home Rule party. In 1872 the Home Rule League was formed, only, however, to die through internal dissensions. Butt himself, being too moderate to satisfy the extreme portion of his following, was denounced, and lost hold of the party altogether. He died in 1879 near Dundrum, in county Dublin.

Butter is the fatty constituent of milk, wherein it exists suspended in the form of minute globules. When the liquid is left at rest, these, together with other substances, rise to the surface and form a layer of cream. The butter is formed on agitating the cream, when an aggregation of these globules ensues. Commercial butter also contains certain

proportions of water and curd, the latter being the cause of the butter becoming rancid. Butter is composed of fatty acids in combination with glycerine, the most important of these being oleic, palmitic and butyric acids, while it is often adulterated with an excess of water and salt or a mixture of ordinary animal and vegetable fats. [CHURN, DAIRY.]

Butter Bird. [BOBOLINK.]

Buttercup, the popular name for the common yellow-flowered species of *Ranunculus* (q.v.), especially *R. acris*, *R. repens*, and *R. bulbosus*. *R. acris* has a slender cylindrical flower-stalk and spreading sepals; *R. repens* has long runners, a furrowed flower-stalk, and spreading sepals; and *R. bulbosus* has a bulb but no runners, furrowed flower-stalk, and reflexed sepals.

Butter Fish, a name for *Centronotus gunellus*, a small fish of the Blenny family, common on the British coasts, and owing its popular name to the shiny secretion from the skin. Called also Gunnel-fish, from the supposed resemblance of the compressed body to the gunwale of a boat. The name Butter-fish is given in New Zealand to *Coridodax pullus*, a large food-fish of the Wrasse family.

Butterfly, the common name of a group of insects forming the sub-order of LEPIDOPTERA known as the Rhopalocera. The term is, however, rather loosely applied to other insects of similar appearance, belonging to other orders, and the differences between the butterflies and moths are not constant. By restricting the name to those Lepidoptera which have club-shaped antennæ or feelers, which fly by day, and in which the two pairs of wings are not linked together by a bristle, it can be used as synonymous with Rhopalocera. Except in the above characters and some habits, such as closing the wings when at rest, the butterflies are so much like the moths that the description of the anatomy of the Hawk-moth (q.v.) suffices for the structure of this sub-order. There are only about seventy British species, and none are more than about two and a half inches broad. The group is essentially tropical: some of the largest, as some of the Ornithoptera (q.v.), are over nine inches in expanse of wing. The main character upon which the sub-order is divided is the condition of the anterior pair of legs; thus in the Nymphalidæ (q.v.) they are rudimentary, *e.g.* the Fritillaries, Purple Emperor, etc.; in the Papilionidæ (q.v.) all the legs are perfect, *e.g.* the Cabbage-butterfly, Swallow-tail, etc., while in the Lycænidæ, such as the Coppers and Blues, those of the male may only be slightly imperfect. The oldest known butterflies occur in the Oolitic rocks.

Butterfly Fish. [BLENNY.]

Butternut, a species of walnut, *Juglans cinerea*, native to the United States, the kernel of which is eaten as a dessert fruit, and also yields a valuable drying oil, similar to walnut oil, and useful to painters or as salad oil.

Butterwort, *Pinguicula*, an interesting genus of *Lentibulariaceæ*, including several British species. They are perennial marsh plants with scanty roots; rosettes of pale green, simple, radical leaves with a viscid exudation and inrolled margins; and single-flowered scapes bearing a bilabiate spurred flower. The leaves are studded with remarkable capstan-like glands, and the viscid secretion not only captures innumerable small marsh flies, which are secured by the slow inrolling of the leaves, but is also acid, and exerts a powerfully digestive action upon nitrogenous substances. In Lapland the leaves are used like rennet to curdle milk, and milk left on the leaf is not only separated into curd and whey, but is afterwards entirely absorbed with the exception of the small proportion of oil. Though the mechanism is comparatively simple, this digestive power is perhaps greater than that of any other insectivorous plant (q.v.).

Buttress, anything built against a wall so as to give it additional support. [FLYING BUTTRESS, HANGING BUTTRESS.]

Butyric Acid. [BUTANE.]

Buxar, a city of Bengal in Shahabad, is situated on the right bank of the Ganges. It was the scene (October 22nd, 1764) of a battle between Sir Hector Munro and Kassim Ali, in which the former was victorious.

Buxton, a town of England in Derbyshire, is situated in a valley famous for its mineral springs, which have made the town a resort for invalids. The scenery in the vicinity is fine; and among places of interest are the Diamond Hill, famous for its crystals, and Poole's Hole, a large stalactite cavern lit by gas. Pop. (1901), 10,181.

Buxton, SIR THOMAS FOWELL, philanthropist, was born in 1786 at Earls Colne, Essex. In 1811, joining the brewing establishment of Truman, Hanbury, and Buxton, which is situated in East London, he was able to see the pitiable condition of the poor, on whose behalf he made his first public speech. In 1818 he entered Parliament as member for Weymouth, and in 1833 succeeded Wilberforce as the champion of the slaves. He was created a baronet in 1840 and died in 1845.

Buxtorf, JOHANN, Orientalist, was born in 1564 at Camen, Westphalia. Becoming professor of Hebrew at Basel in 1590, he remained there until his death in 1629, devoting himself to the study of Hebrew and Rabbinical literature. So complete was his knowledge of this subject that he was known by the title "Master of the Rabbins." His son, JOHANN, commonly called "junior" to distinguish him from his father, succeeded to the Hebrew chair in 1630 at Basel, where he died in 1664. He completed his father's *Lexicon Chaldaicum Talmudicum et Rabbinicum*.

Buzzard, any individual or species of the genus Buteo, of the Falcon family. The bill is rather small and weak, part of the cutting edge of the upper mandible projects slightly; cere large, nostrils oval; tarsi short, strong, scaled or feathered, toes short, with strong claws. The common Buzzard (*Buteo vulgaris*), distributed generally over Europe, and occurring in Asia and Africa, was formerly common in Britain, but is now becoming rare. The adult

male is from 20 to 23 inches long; the plumage is of various shades of brown, with markings of black above and of white beneath. Great variations, however, occur; some birds are of a uniform chocolate brown, others of a yellowish-white with a few brown feathers here and there. Albinos are not uncommon, and there is a fine specimen in the Norwich museum. The female is larger than the male, and generally darker in hue. The Buzzard builds in the forked branches of trees, in crevices in the rocks, or on ledges of cliffs, but prefers to utilise the nest of some other large bird. The eggs, from two to four in number, vary from white to bluish-white, with yellowish-brown streaks and blotches. The flight of these birds is somewhat slow and laboured, and they prey upon reptiles, mice, and small birds. One author asserts their usefulness in preserves in killing off sickly game, and so contributing to the perpetuation of a healthy race. In captivity female buzzards are so much inclined to brood, that they have more than once sat upon hen's eggs and hatched and reared a brood of chickens. The Rough-legged Buzzard (*B. lagopus*) is more widely distributed, and has the tarsi feathered down to the origin of the toes, whence it is sometimes made the type of a genus —Archibuteo. [HONEY BUZZARD, OSPREY.]

Byblos, an ancient maritime city of Phœnicia, is situated a little to the north of Beyrout, at the foot of the lower range of the Libanus. It is now named Jubeil, and was famous as the seat of the worship of Adonis or Tammuz. It was called by the Jews Gebal.

Bye-laws, the regulations of a Corporation, agreed to by a majority of its members for the purpose of more conveniently carrying into effect the object of the institution. It is not every voluntary association which by the law of England has power to bind its members by rules acquiesced in by the majority. Immemorial custom, or prescription, or legal incorporation by the sovereign, or some act of Parliament, is necessary to confer the power of making bye-laws; and even in these cases the superior courts of law can take cognisance of the bye-law and establish its legality or declare it to be void. In order to stand this test, a bye-law must be reasonable and consistent with the law of England. The power of making bye-laws is often vested in a particular class of persons having no strictly corporate character, as the tenants of a manor, the jury of a court leet, the inhabitants of a town, village, or other district; but with corporations the power to do so is inherent without any specific mention of it in the charter of incorporation. The Municipal Corporations Act 5 & 6 Wm. IV., c. 76, gives to the town councils a power of making bye-laws for the good rule and government of the boroughs, and for the suppression of various nuisances, and of enforcing the observance of them by a fine to the extent of £5. Bye-laws must be approved by the Privy Council, and railway bye-laws have to receive the sanction of the Board of Trade. In Scotland a corporation or other community can make its own bye-laws, provided they do not infringe the law of the land.

Bygas (BAIGAS), a numerous non-Aryan people of the Satpûrah Mountains, south of the Upper Nerbada, Central India, between the Gond and Bhîl territories; are regarded by the Hindus as Bhûmiyas, *i.e.* Aborigines; classed by Dalton with the Bhuias (q.v.), they resemble the Gonds in appearance but are of darker complexion and more robust; there are three main divisions: Binjwar (Bichwar), Mundiya, and Bhirontiya, each with seven sub-branches. (See *Gazetteer of the Central Provinces*, p. 278.)

Byng, (1) GEORGE, VISCOUNT TORRINGTON, born in 1663, entered the navy in 1678. He imbibed revolutionary sympathies, and as an Orange agent was instrumental in winning over the fleet to the cause of William in 1688. He was accordingly made a post-captain at the close of that year. He commanded the *Hope*, 70, at the battle of Beachy Head in 1690. In 1703 he was promoted to be rear-admiral, and in the following year he commanded the attacking squadron at the capture of Gibraltar, while soon afterwards he headed a division at the battle of Malaga. For these services he was knighted. He became a vice-admiral in 1705, and in 1706 was in command at the capture of Alicant; but the great success of his career was won in 1718, when he gained the great victory over the Spaniards off Cape Passaro. For this he was created a viscount. In 1727 he was called to serve as First Lord of the Admiralty—an office which he retained until his death in 1733. (2) His fourth son, the HON. JOHN, was born in 1704, and, having entered the navy, rose rapidly to the rank of full admiral. In 1756, being sent to drive the French from Minorca, he was unsuccessful, and was, upon his return, brought to trial and condemned to death. In spite of recommendations to mercy, he was shot on board the *Monarch* at Portsmouth on March 14th, 1757. There is now little doubt that he suffered undeservedly.

Byrd, WILLIAM, composer, was born about 1538. In 1563 he was appointed organist of Lincoln, and in 1569 a gentleman of the chapel royal. He was the composer of the first English madrigals, and among his sacred pieces is the well-known *Non Nobis, Domine.*

Byrgius, JUSTUS, inventor, was born in 1552 at Lichtensteig, Switzerland. He is reputed, on doubtful evidence, however, to have discovered logarithms and to have made important discoveries bearing on astronomical science. He died in 1632.

Byrom, JOHN, poet and stenographer, was born in 1692 at Kersall Cell, Broughton, near Manchester. After graduating at Cambridge and studying medicine, he began to teach a new system of shorthand in London, Parliament in 1742 conferring on him, as the inventor, the sole right of teaching this system for twenty-one years. He died in 1763. Ten years later his poems were first collected and published. They show great facility in rhyming, and are humorous and satirical.

Byron, GEORGE NOEL GORDON, Lord Byron of Rochdale, Lancashire, a famous poet, author of

Childe Harold, *Don Juan*, and other well-known works, was born in Holles Street, London, January 22nd, 1788. He was grandson of Admiral Byron and son of Captain John Byron, an officer in the Guards. His mother, Catherine Gordon, of Gight in Aberdeenshire, was the second wife of Captain Byron, who had previously been married to the divorced Countess of Caermarthen, by whom he had a daughter, the Hon. Augusta Byron, who afterwards married Colonel Leigh. Between this lady and her young half-brother, Lord Byron, there was a constant and sincere affection, even when the latter, deserted by many of his friends and abused by his enemies, lived almost in solitude, and eventually left England to take up the cause of political freedom, first in Italy and afterwards in Greece.

Captain John Byron died in France after squandering nearly all the fortune of his second wife, who was left with her infant son in comparative poverty, the estate of the Byrons at Newstead Abbey having been greatly reduced by the extravagance of the grandfather, and by a lawsuit on the part of the uncle, from whom the young lord inherited it. The widow, whose income was little more than £150 a year, had taken her boy to Aberdeen, where, when he was about five years old, he was sent to a day school for a year, and afterwards to a school kept by a Mr. Ross. From there he went to the Aberdeen grammar school, where, in spite of his lameness, he joined successfully in sports that required great activity. He was born with a contracted foot, such as is known as club foot, and one of his intimate friends declared that both feet were deformed. In 1796 Mrs. Byron took her son to the Highlands, where the scenery made a great impression on the boy's imagination and excited in his mind that love for the wild and grand aspects of Nature which is expressed in some of his poems.

Even at an early age the intensity of his sentiments was manifested, his affections and his dislikes were strong and influenced all his actions. When he was only eight years old he cherished a boyish love for his cousin, Mary Duff, and he long afterwards declared that his misery and his love for the girl were so violent that he doubted whether he had afterwards experienced any other real attachment. A nature like his needed great maternal care; but his mother, though she indulged and petted him, was a woman of violent temper, and often not only flew into a passion with him, but in the paroxysm of temper would fling at him whatever came to hand, and would speak of him as "a lame brat." In 1799 Mrs. Byron took her son to London, and in the following year sent him to Harrow, where he soon entered into the life and recreations of the school. In 1803 he spent his holidays in Nottinghamshire, where he met Mary Chaworth, the daughter of Mr. Chaworth, of Annesley, and became violently in love with her, a passion which the young lady neither encouraged nor returned. Two years afterwards he went to Cambridge University, where he made many friends and wrote several poems, which were printed in a volume for private circulation. One of his friends expostulated with him because of the immorality of one of these poems, and he immediately cancelled the whole edition and published another, which was sold to the public and achieved marked success. He spent a vacation in London, where he indulged in the dissipation that was customary among a certain class of young men of fashion at that time; but he was keenly susceptible of the real loneliness of his position amidst exaggerated praise for his brilliant abilities and equally exaggerated blame for what were supposed to be his licentious opinions. He had no friend or relations to whom he could appeal for guidance even had he wished to seek it, and his mother's violent temper had led to estrangement. A criticism on his poems, *Hours of Idleness*, in the *Edinburgh Review*, led to his publishing, in 1809, his satire called *English Bards and Scotch Reviewers*, which made a great sensation, though he afterwards retracted much that he had said because of its injustice. Early in 1809 his coming of age was celebrated at Newstead Abbey, and he took his seat in the House of Lords, but his loneliness, the neglect which he experienced, and his narrow pecuniary means, led to his leaving England. Passionate, but capable of deep affection and ardent friendship, and generous to all who sought his aid, Byron was too sensitive to bear the monotony of mere fashionable life without those deeper interests which engage the heart and the sentiments. For nearly two years he travelled in Portugal, Spain, Greece, and Turkey, and during his journey wrote the first and second cantos of his great poem, *Childe Harold*. He returned to England in 1811, when he heard that his mother was seriously ill at Newstead Abbey, whither he went too late to see her alive. In the following year the first part of *Childe Harold* was published, and he at once rose to fame and popularity. The payment for this and other work was handed to a friend, and for some years, until his own pressing needs compelled him to make personal use of the money, he would not accept any pecuniary advantage from his poems. In 1813 *The Giaour*, *The Bride of Abydos*, and the *Corsair* were published, and in 1814 *Lara* appeared. In the latter year, acting on the advice of friends, he proposed to marry Miss Milbank, who accepted him, and the wedding took place in January, 1815. His daughter Ada was born in the following December, and in January, 1816, Lady Byron left London on a visit to her father in Lancashire. Husband and wife seem to have parted in affection and regard, but immediately after her arrival her father wrote to tell Lord Byron that she would not return. The reason for this determination has never been known. Byron himself seems to have declared that he was unacquainted with any just grounds for it, and at a time when he was surrounded by pecuniary difficulties, and was almost overwhelmed—"standing alone on his hearth with all his household gods shivered round him"—he received the message that his wife, of whom he continued to speak with affection and respect, had parted from him for ever.

Then a storm of abuse and expressions of hatred and scorn burst around him. The number of those who accused him of all kinds of infamy was greater than that of his admirers. He had strongly

satirised the vices of society, which he had attacked with the weapons of scorn and sarcasm, and now society turned on him. Strongly influenced by intense sympathy with oppressed peoples and nationalities struggling for freedom, he determined to leave England. In 1816 he departed on a journey to Switzerland, and on the way composed a further instalment of *Childe Harold*, and completed several other poems. From Geneva he went to Venice, where he continued to work and commenced *Don Juan*. From a course of degrading dissipation he was aroused by a sudden passion for the Countess Guiccioli, with whom he afterwards lived for some years; and he became a member of the Italian democratic revolutionary society, called the *Carbonari*. At the failure of the Italian revolution in 1821 he went to Pisa and afterwards to Genoa, where he threw himself with burning zeal into the Greek revolution. His money, his time, his talents, were devoted to the cause of Greek Independence. He went to Missolonghi, where he was appointed commander-in-chief of a proposed expedition against Lepanto. This was in January, 1824. On the 22nd he wrote the Lines *On Completing his 36th Year*. The climate was such as to sap all his vital force, and on the 18th of February he was seized with a fit, from which he never really recovered. He died on the 19th of April, his last utterances being those of the names of his sister "Augusta," his daughter "Ada," and "Greece." Three weeks of general mourning were observed at Missolonghi with funeral services in all the churches before his body was conveyed to England, where, after a funeral ceremony in London, it was placed near the tomb of his mother in the ancestral vault of Hucknall Torkard church, Notts, where his beloved sister placed a tablet over his grave.

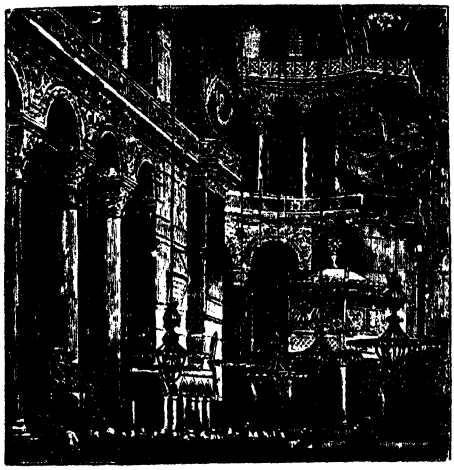
Byron, HENRY JAMES, dramatist and actor, was born in 1834 in Manchester. In 1858 he entered the Middle Temple, contributing extensively to periodical literature, and writing almost innumerable farces, burlesques and extravaganzas. His most successful piece was *Our Boys;* others were *Cyril's Success*, *Dearer than Life*, *Blow for Blow*, *Uncle Dick's Darling*, etc. He died in 1884 in London.

Byron, HON. JOHN, British navigator and admiral, was second son of William, fourth Lord Byron, and was born in 1723. Entering the navy, he accompanied Anson on his celebrated voyage to the South Seas, and had the misfortune to be wrecked in the *Wager*, and to suffer almost unexampled hardships. After more than four years' absence from England, he returned, and was rapidly promoted to the rank of captain. He served almost continuously, but without gaining any great distinction till 1760, when, as commodore, he undertook and effectually completed the destruction of Louisbourg. He next commanded in the *Dolphin*, 20, a small expedition to the South Seas, where he made numerous discoveries. In 1769 he was made governor of Newfoundland, and in 1775 became rear-, and in 1778 vice-admiral. In the latter capacity he was employed in command of a squadron in North America and the West Indies, where, on July 6th, 1779, after many months of manœuvring, he engaged the French admiral D'Estaing, who, although he suffered very severely, escaped a positive defeat. Admiral Byron then returned to England, where he died in 1786.

Byzantine Architecture is the name given to that architectural style which was developed and practised in the east of Europe and in Syria, receiving its chief impulse in 330 A.D., when Constantine transferred the seat of his empire from Rome to Byzantium, and gave the capital its new name, Constantinople (city of Constantine). Based in its origin on the decadent forms of the Roman style, and employing at first the traditional plans of Roman buildings, a new life would seem to have been given to it; firstly, by the special arrangement of the buildings constructed to meet the requirements of the new religion to which Constantine had become a convert; secondly, by the employment of materials different from those found in or imported to Rome; and thirdly, by the employment of a new traditional art which had probably gradually been developed in Syria and North Egypt, and of which the only remains are those found in the tombs in or near Jerusalem, and in some of the dead cities of Central Syria explored by M. de Vogué. Of Constantine's work the only example now known to exist is the basilica church at Bethlehem, the nave of which is ascribed to him. The columns are of stunted proportions, wanting the elegance of Roman examples, and the corinthian capitals are of coarse and clumsy execution: the buildings which Constantine constructed in Byzantium (and which consisted not only of churches, but of palaces, amphitheatres, and thermæ in imitation of those in Rome), were apparently erected in such haste that they speedily became ruins. Some of the ancient cisterns underground, whose vaults are carried on columns (one of these cisterns being reported to have no fewer than one thousand columns), are supposed to be of the time of Constantine, but at all events above ground there remain no structures of his period.

The new style would however, appear to have made rapid progress in the two centuries which followed, for in no other way would it be possible to account for the magnificence both structurally and artistically of the church (now the mosque) of St. Sophia at Constantinople, which was erected by the Emperor Justinian (commenced 528 A.D.), and which not only marks the culminating period of Byzantine architecture, but is still one of the great masterpieces of the art. (*See* Fig. 1.) An earlier building, ascribed also to Justinian art, which is said to have been built on the foundation of an earlier church by Constantine, viz. the church of St. Sergius and Bacchus (known as the lesser St. Sophia) indicates the direction in which the Byzantine architects were tending. The defect of the ordinary basilica lay in its timber roof, so easily destroyed by fire. Already in the basilica of Maxentius at Rome, completed by Constantine, and the remains of which still exist, a vault of prodigious space, 80 feet, had been thrown across the nave, and there is no doubt that this would have

been the type selected by Constantine if, in the foundation of his new city, he could have undertaken so great a work; in fact, in his letters to Macarius, Bishop of Jerusalem, transcribed in Eusebius, he suggests the covering of his church by some other material than that of wood. It was



BYZANTINE ARCHITECTURE. (Fig. 1. *Interior of St. Sophia's.*)

left, however, for Justinian to realise the dream, and in the church of St. Sophia to produce a structure homogeneous in its material throughout, and covered with a magnificent vault.

The church of St. Sergius and Bacchus, already referred to, is octagonal in plan, and covered with a dome which is carried on arches supported by eight piers. The problem which Justinian attempted to solve was to support a dome on arches carried by four piers. The plan of the four arches being square, whereas the dome is circular on plan, it became necessary to build on the extrados of the arches what are known as pendentives, spherical triangles to fill the space between, and support the base of the dome. As the dome was 107 feet in diameter, those spherical triangles are about 70 feet wide at the top and 52 feet high, being, therefore, of colossal size. The means adopted to build these pendentives is not known, and two failures which happened in the great arches are described by Procopius, an historian of the period. Only twenty years after the erection (558 A.D.) a portion of the dome was overthrown by an earthquake, and a new dome, with forty circular-headed windows at its base, was erected in its place, the actual effect being, as described by Procopius, "as if it was sustained by a chain from heaven." The two side arches, north and south, were filled with a wall pierced with windows and arcades on two storeys, and immense apses were thrown out towards the east and west ends, so that the plan is that of an oblong square. The lower portions of the walls are panelled with marble, in which material are also the arcades with their columns and capitals; the remainder of the interior is covered with mosaics, which, as they represent figure subjects, forbidden by the Mohammedan religion, are now covered with stucco and painted. The exterior, owing to the flatness of the dome and the solidity and size of the buttresses and masonry round, does not convey any idea of the beauty of the interior. The type of church thus conceived and carried out by Justinian became the example on which has been based the greater number of churches devoted to the Greek ritual not only in Greece but throughout Russia. No attempt, however, has since been made to produce a dome of such great size, and the subsequent examples have rarely exceeded 50 feet in diameter. In order to give increased space, however, the nave and choir were lengthened, and transepts were thrown out on each side of the central dome, and these were also covered by domes, the best example of which is that found in St. Mark's at Venice (the present external domes of this church are only of timber covered with lead and do not belong to the original structure). The principal difference to be noted in the later Greek churches was the raising of the dome on cylindrical walls of masonry or brickwork pierced with windows. (*See* Fig. 2.) Of the fifth and sixth centuries there still exist at Thessalonica and elsewhere churches of the ordinary basilica type with timber roofs, which differ from the Roman examples chiefly in having arches instead of architraves to carry the nave walls. The influence of Byzantine architecture on Western architecture besides St. Mark's is seen

BYZANTINE ARCHITECTURE. (Fig. 2. *Exterior of St. Theodore's, Athens.*)

in the churches of St. Vitale, St. Apollinare, in Navem, and St. Apollinare-in-classe, all in Ravenna, and in the south of Italy and Sicily. At Monreale near Palermo is a magnificent basilica church with marble panelling and mosaic decoration to the

internal walls. Many of the earlier Romanesque churches of Rome have the vaults of their apses covered with Byzantine mosaics, and in the south of France at St. Front-de-Perigueux, and in the Charente we find the dome as a characteristic feature, owing, probably, to the settlement of Greek artists in the south of France.

Byzantine Empire, called also the Eastern or Lower Empire, or yet oftener the Greek Empire, may be said to have taken its rise in 395 A.D., when upon the death of Theodosius the Roman Empire was divided into two parts, and shared between Arcadius and Honorius. The former established his seat of government at Constantinople, which had been founded in 330 A.D. upon the site of the ancient Byzantium, and ruled over Syria, Asia Minor, and Pontus upon the Asiatic side of the Black Sea, Egypt in Africa, and Thrace, Mœsia, Macedonia, Greece, and Crete in Europe. The history of the Empire is generally divided into four periods: (1) Its growth from 395 to 716; (2) its time of prosperity from 716 to 1057 (Leo III. to Isaac Comnenus); (3) a period of decay from 1057 to 1204; (4) its decline and fall from 1204 to 1453, in which year Constantinople was taken by the Turks.

The choice of a new capital had been in a measure forced upon Constantine by his conversion to Christianity, Rome itself being the head-quarters of Paganism. No better site could have been chosen than Constantinople, which is the key of two continents and two seas, and is still a bone of contention to European powers. The new capital was Roman in nature, the privileges of its people were those of Roman citizens, and the official language was Latin, but by Justinian's time (527–565) the prevailing language of the Empire was Greek, and all the highest officers were Greeks. Of the first period above-mentioned, the best known period is that of Justinian's reign, which, though really injurious to the Empire, seemed particularly brilliant, owing both to the great legal measures which bear his name, and also to the campaigns of his generals Belisarius and Narses, which restored the shaken power of the Empire in Africa, and in Italy and Southern Spain. In his reign, too, the church of St. Sophia was built. Another marked feature of the first period was the continual irruption of barbarians, which seriously threatened the supremacy, if not the existence of the Empire; while upon the eastern side it had a formidable enemy in Persia, which indeed bade fair to overturn it at the period when Heraclius, by his campaigns and brilliant victories, saved the Empire, and gave Persian power its death-blow. But the exhaustion that followed upon these campaigns injured the Empire, since it favoured the growth of the newly-appearing power of the Saracens. At the beginning of the eighth century the Empire was in a perilous state, and seemed likely to fall, as the Western Empire had done before it, for in Europe the Bulgarians threatened it, the Saracens were overrunning the Asiatic possessions, and attacked Constantinople, and many of its provinces were lost, while rebellion and anarchy reigned at home and the Greek race seemed in danger of being destroyed. It was at this time that Leo the Isaurian came into power, and inaugurated the second period (716–1057), the time of prosperity—a period the first century and a half of which was marked by the Iconoclastic dispute, and the remaining two were coincident with the Basilian dynasty. Leo III., with whom, in the opinion of some historians, the Byzantine Empire—as distinguished from the Eastern Roman Empire—really began, rearranged the country for military purposes, reorganised the financial system, simplified the laws, and endeavoured to reform the church—an attempt in which he was warmly seconded by his son, Constantine V., who was an ardent Iconoclast. The controversy was not entirely one simply about the use of images. Beneath it were lying the deeper issues of aggression upon liberties, and the growth of despotism. The religious question was finally set at rest in 842, in the reign of Michael III., not however till it had cost the Empire its dominions in central Italy. Two formidable enemies were at the door of the Empire—the Saracens, who were at the height of their power, and to whom, in 1045, Constantine IX. laid open his country by destroying an Armenian kingdom which had been the bulwark of the frontier; and the Bulgarians, who having founded a kingdom in Mœsia had become Christians, and had gradually enlarged their territory to an extent equal to the European part of the Byzantine Empire. The Bulgarian power was however brought to an end by Basil II., and in 1018 the people submitted to the Greek power. A third enemy who appeared in this period, but who became afterwards fast friends, were the Russians, who made several bold and daring attacks upon the capital, their representatives sometimes being the Scandinavian Varangians, who at a later period formed the trusted body-guard of the Emperors. Readers of Sir Walter Scott's *Count Robert of Paris* will remember the Varangian Guard. It was during this period that a plague devastated the Empire, and was the cause of colonies of Slavs and Albanians being brought in to occupy the districts made vacant by those who died of the plague, or were induced to go to Constantinople to fill up the gaps caused by the plague there. Some (the Austrian historian Fallmerayer in particular) have held that owing to the number and extent of these colonies, not a drop of Greek blood is to be found in Greece at the present day. Probably, however, this view is very much exaggerated. The third period (1057–1204) extends from the accession of Isaac Comnenus to the taking of Constantinople, and is one of high civilisation but (with periods of revival) gradual decay. And yet the period of the Comneni is more familiar to us than any other, owing to the intercourse of the Crusaders with the Empire, and to the fact that the new Greeks began to have a literature, and that we have contemporary accounts of events, notably that of Anna Comnena who has described to us the Crusaders and the impression they created, and on whom Sir W. Scott has freely drawn for materials in the romance above-mentioned. Though the Crusaders arrived in the East

at the invitation of the Greek Emperor, and did check the advance of the Seljuk Turks, yet they were by no means an unmixed good to the Empire, and seemed to care little whether they fought against the Saracens or plundered the Greeks. There were no doubt faults on both sides, but nothing has been shown to warrant the piratical expedition which goes by the name of the Fourth Crusade, which dismembered the Empire, and gave it a Latin dynasty, which after a few years of feeble existence was thrust off the throne by Michael Palæologus, who, though he did his country some good, did more to hasten its ruin. He debased the coinage, killed the trade of his subjects by the privileges he granted to the Genoese and Venetians, and utterly alienated the minds of his people by consenting to the reunion of the Eastern and Western churches. For the rest of this last period the Empire languished away, while the Ottoman Turks waxed stronger and stronger, and encroached more and more upon the few remaining possessions of the Empire, till the struggle culminated in the siege of Constantinople by Mahomet II., in 1453, and its final capture, when the last Emperor died defending the breach, and his conqueror passed in over his body. A spirited and interesting account of the siege and fall of the city is to be found in the tale *Theodora Phranza*.

Byzantium, the ancient name of Constantinople, was founded B.C. 667 by Greek colonists. Becoming an important commercial centre from its position, it passed, after various vicissitudes, under the sway of Rome, and in 330 A.D. Constantine the Great made it the capital of the Roman Empire.

C

C. The letter C is derived from an earlier form of the Latin G, which was used indifferently to express the sound of G and K in Latin till about 230 B.C. After that, C was used, probably, only to express the sound of K. In English it at first had only this sound, and in Welsh spelling it still retains it exclusively: but when (about the 10th century), the K sound in some English and French words became modified into a sound resembling ts, C also was used for it. In modern English it is used before E and I to express the sound of S. As a numeral in the Roman system it represents 100. In music C is the keynote of the "natural" scale. For the history of the sign *see* ALPHABET; for its other uses as a sign *see* ABBREVIATIONS.

Caaing Whale, a popular name for *Globicephalus melas*, a cetacean of the dolphin family. The head is massive and boss-like, the body is cylindrical in shape, tapering to the deeply cleft tail, and uniform black in colour, except on the belly, which is whitish. The dorsal fin is high and triangular, and the fore limbs are usually long and narrow. Total length of adults from 16 ft. to 25 ft., girth about 10 ft. These whales, which feed principally on cuttle-fish, are mild in disposition, and extremely gregarious in habit, and when in danger frequently follow the leader of the drove to destruction. They often occur in large schools round the north-eastern islands of Scotland, and sometimes as far south as the Firth of Forth. Some other species are found, widely distributed, but they have not been accurately distinguished.

Cabal, originally a secret committee of advisers of the king; but in English history specially applied to the ministry formed under Charles II. after the fall of CLARENDON (q.v.). The initial letters of the names of its five members, Clifford, Arlington, Buckingham, Ashley-Cooper, afterwards Earl of Shaftesbury, and Lauderdale—spelt the word. This "Cabal" held office from 1668 to 1673. At first, as a concession to public opinion, they formed the Triple Alliance between England, Holland and Sweden to check the advance of the French and the Netherlands. But—though otherwise differing widely in opinion—they agreed in a wish to strengthen the royal prerogative, which could only be done with the aid of the French king, Louis XIV. Secret negotiations with him, therefore, were begun very soon after the conclusion of the Triple Alliance; Parliament, which might have proved inconvenient, was prorogued in 1671, and money was obtained by suspending, nominally for one year, the repayment of the loans made by bankers to the exchequer; the Dutch fleet of merchant vessels returning from Smyrna was attacked in time of peace, and war declared with Holland. But Holland rid herself of Louis XIV.'s army by cutting the dykes and flooding the country, and her squadron successfully resisted the English fleets in battle. The Cabal meanwhile caused the king to issue a Declaration of Indulgence to Nonconformists, suspending the penal laws in their favour. But this was viewed with suspicion, as a possible step towards Catholicism. Supplies being necessary, Parliament was summoned; the opposition or "country party" carried a large majority of the seats; the Test Act was carried, and all the Cabal resigned save Lauderdale.

Caballero, FERNAN, the name adopted for literary purposes by CÆCILIA BŒHL (1797–1877), a Spanish literary lady, born at Morget in Switzerland, the daughter of a German merchant named Nicholas Bœhl. She was educated in Germany, and returning to Spain in her seventeenth year, she married a Captain Planelles. Soon becoming a widow, she married the Marquis of Arco Hermoso, who died in 1835; and she then married for the third time, her husband being a barrister, Antoine d'Arrom, who went to Australia as consul, and died in 1863. After that, Madame d'Arrom lived in retirement at Seville. Her first work, which appeared as a feuilleton, was *Gaviota*, and it at once established her reputation, and from that time forward she published a great number of novels and stories, in which she paints, with charming precision, the types of people, the manners, and the customs of Spain, especially of Andalusia, which is the most unsophisticated part of the country. Besides her original works, she made a collection of popular stories and poems called *Cuentos y poesias populares Andaluces*, and a *Coleccion de articulos*

religiosos y morales. La Mitologia contada a los Niños, Elia, Clemencia, are some of her best known works.

Cabanagem, or hut-dwellers (*ca-bana*) of Brazil, who rebelled in 1833 and overran the Amazon valley, committing many atrocities. The rebellion was subdued in 1836 by Gen. Francisco de Andrea, who was president of Para in 1835 and later created Baron of Caçapava.

Cabanis, PIERRE-JEAN-GEORGE (1757–1808), French physician and philosopher, born at Cosnac, Charente-Inférieure, was educated at first at the college of Brives, from which he was sent home to his father owing to his determination in resisting the course of study prescribed by his teachers. His father also tried force, with no result, and then adopted the extreme course of taking him to Paris at the age of fourteen, and leaving him to his own devices. This hazardous project succeeded admirably, for all the force of will which young Cabanis had hitherto employed in resisting authority, he now threw into his work. In 1773 he went to Warsaw as secretary to the Prince-Bishop of Wilna, just at the time of the partition of Poland. Two years after he returned to France, and under the influence of the poet Roucher he turned his attention to poetry, with next to no result; and under pressure from his father he chose the profession of medicine, though he never practised much, preferring the generalities of science to its details, and confined his labours to philosophy and to medical physiology. His first work was *Observations on Hospitals* (1789); and of many others written by him the most notable are *Rapports du Physique et du Moral de l'Homme* and *Lettres sur les Causes premières*. He also wrote on social and political subjects. His philosophy was of a materialistic nature. At the Revolution he ranged himself upon the popular side, and became a member of the council of Five Hundred. Later Napoleon made him a senator and commander of the Legion of Honour.

Cabbage, the common name for *Brassica oleracea* [BRASSICA], especially for those cultivated varieties that have their leaves uncut and uncurled and overlapping so as to form a head or heart. *B. oleracea capitata*, the common cabbage, was introduced into England by the Romans, into Scotland in the time of Cromwell. Its heart is generally blanched. In Germany it is shredded, salted, and fermented for winter use, under the name of *sauer kraut*. The red variety, *B. oleracea rubra*, is grown for pickling. The savoy is *B. oleracea bullata*, having its leaves raised in small "bullate" swellings between the veins. *B. oleracea costata* is the large-ribbed cabbage or *couve tronchuda* of Trauxuda in Portugal, of which the mid-rib is eaten. Cabbages are improved by being slightly touched by frost. Forms with loosely-arranged leaves (*accphala*) are known as borecole or cow-cabbage. In Jersey cabbages are grown to a considerable height by stripping off their lower leaves, and are made into walking-sticks. [BRUSSELS SPROUTS, CAULIFLOWER.]

Cabbage Butterflies, the name given to several species of white butterflies, of which five occur in England; they belong to the genus *Pieris*. As they are usually born in successive broods, they occur all the year round, and are the most familiar of British butterflies. *P. rapæ* is the best known, and sometimes occurs in great swarms. It has now become established in Canada.

Cabbage Moth (*Mamestra brassicæ*) one of the commonest of British Noctuæ; it lays its eggs as a rule on cabbages, upon the leaves of which the larvæ feed; it may, however, use other plants. It must not be confused with the Cabbage Butterflies, which are better known.

Cabbage Palm, a name applied to *Areca oleracea* and other palms, the large terminal buds of which are cooked and eaten.

Cabbala (Heb. *Kabbal*, to receive), the secret oral tradition as to the mystic meaning of the Pentateuch, reputed to have been received from God by Moses, and handed down to Joshua. In fact, however, it originated in Babylon during the captivity, and was put into writing by Simon ben Jochai about A.D. 125. It professes to give the mystic meaning of the Jewish system of theology and cosmogony, and even of every word and letter in the law.

Caber (from a Celtic word=*pole*), a tapering pine trunk, some twenty to twenty-five feet long, roughly hewn and stripped of its branches, used in the Highland sport of tossing the caber. It is held upright, with the small end first downwards and level with the breast, then raised to the shoulder, and is then tossed so that the thick end touches the ground first. The farthest toss and straightest fall wins.

Cabes, or GABES, at the head of a gulf of the same name; anciently *Syrtis Minor*, a port in a fertile district of Tunis. In ancient times it was an episcopal see, and was a rich fortified town in the middle ages, but now it is much decayed. The harbour admits only small vessels, and the commerce is greatly diminished.

Cabet, ETIENNE (1788–1856), founder of a French sect of communists, was born at Dijon, the son of a cooper. He became an advocate, and obtained a legal appointment in Corsica, which he lost owing to the expression of views which were too democratic for the government. He was elected to the chamber of representatives, but in 1834 his attacks on the government led to his prosecution and flight to England. Here he read More's *Utopia*, and after his return to France in 1837, he wrote his *Voyage en Icarie*, a Utopian romance, that became the textbook of the communist sect of "Icarians." In 1848 he sent out a communistic colony to Red River, Texas, and the next year went out himself. Finding his new colony at sixes and sevens, he left them to themselves, and went with a few followers to Nauvoo, from which the Mormons had been expelled, only returning to France when some of his former colonists accused him of fraud. When acquitted, he returned to America, and remained at his new colony till in consequence of dissensions he was removed from the command of it, and visited

with a kind of ostracism. He then retired to St. Louis, where he soon died broken-hearted.

Cabinda, the dominant nation in the Kakongo district on the north side of the Congo estuary. They are a branch of the Congo people [CONGO], with whom they inherit the traditions of European culture, introduced by the early Portuguese missionaries. The port of Cabinda, to which they give their name, is one of the most industrious places on the west coast of Africa, supplying the best artisans and the best sailors on the whole seaboard. Here are found excellent blacksmiths, masons, joiners, and carpenters, who build the so-called *palhabotes*, small seaworthy vessels, which carry on most of the coasting trade between the Gaboon and Mossamedes. Their religion is a curious mixture of Christian and Pagan rites, baptism and processions headed by the crucifix being combined with circumcision and witchcraft, while the great goddess Nzambi is confounded with the Virgin Mary or the Earth, "Mother of all." She is represented by a terrible fetish, who strikes dead those guilty of eating forbidden meats, obviously a reminiscence of the Roman Catholic days of abstinence. Many of the Ba-Fyots, *i.e.* "Blacks," as they are also called, bear Portuguese names, and the chiefs are attended by officials with titles and functions introduced by the Portuguese over 300 years ago.

Cabinet. Though virtually the centre of the parliamentary system of government, the British cabinet is, properly speaking, unknown to the Constitution except as a matter of usage. Theoretically, it is an irregular committee of the privy council, a body which, in Charles II.'s time, became inconvenient from its numbers and the consequent lack of secrecy in its proceedings. Charles II. therefore formed a special advisory committee or "cabal" (q.v.) from it, and the practice, though at first very unpopular, was continued by William III., under whom it obtained more definite duties, and its members usually sat in one or other House of Parliament. But it still contained members of both political parties at once. Under the first two Georges two great changes took place, (1) the kings ceased to attend, not knowing English well; (2) the Tories, being suspected of Jacobitism, were excluded from office, so the cabinet was confined to one party. When Pitt took office in 1783 the post of Prime Minister assumed something of its present prominence. At present it is understood that the members of a cabinet agree on their general political opinions (or in a coalition cabinet on certain specified points); that they are jointly responsible for the action of the government, and that they act in concert. Their deliberations are secret, no minutes of proceedings are taken, and they are bound not to reveal what passes. In practice they are chosen by the Prime Minister, but his choice is usually almost determined beforehand by the force of circumstances and public opinion. The members of a cabinet usually vary from twelve to fifteen, but in 1900 the number was as large as twenty. The Irish Secretary the Postmaster-General, and the President of the Local Government Board, are sometimes, but not always, included in it. In the parliamentary governments of the colonies and foreign countries the Cabinet has a more explicit recognition in the Constitution.

Cable, a substantial rope or chain to which the anchor is fastened, and which is used to retain a ship at anchor in a road, bay, or haven. Rope cables, which are now generally disused in favour of chain ones, were, among European nations, manufactured of hemp, and formed of three separate ropes, called strands, twisted together. Each of these was made up of three smaller strands, each composed of a given number of rope-yarns. A few Italian cables were made of four strands. The proper length of all rope cables was 120 fathoms, or 720 feet. These cables were classified according to their circumference in inches; and the particulars of the chief of them were as follows:—

Circumference.	Number of Rope Yarns.	Weight of Cable.	Circumference.	Number of Rope Yarns.	Weight of Cable.
Inches.		lbs.	Inches.		lbs.
3	48	192	12	609	2796
5	121	484	14	952	3808
7	238	952	16	1244	4976
9	393	1572	18	1574	6296
11	598	2392	20	1943	7772

Rope cables, of hemp, are now used only for deep water work. For ordinary work chain cables, 100 fathoms, or 600 feet, in length, are now universally employed. They are classified according to the diameter of the iron forming the links; and, as supplied to the navy, are of the following sizes:— $\frac{7}{16}$ in., $\frac{1}{2}$ in., $\frac{9}{16}$ in., $\frac{5}{8}$ in., $\frac{11}{16}$ in., $\frac{3}{4}$ in., $\frac{7}{8}$ in., 1 in., $1\frac{1}{8}$ in., $1\frac{1}{4}$ in., $1\frac{3}{8}$ in., $1\frac{1}{2}$ in., $1\frac{5}{8}$ in., $1\frac{3}{4}$ in., $1\frac{7}{8}$ in., 2 in., $2\frac{1}{8}$ in., $2\frac{1}{4}$ in., $2\frac{3}{8}$ in., $2\frac{1}{2}$ in., and $2\frac{3}{4}$ in. The weight of the last mentioned cable, per 100 fathoms, should be 363 cwt.; that of the first mentioned 9 cwt. 0 qr. 21 lbs. Each is divided into eight "shackles," and, before issue, must pass through a very severe test, the imposition of which is regulated by law.

Caboshed, or CABOSSED, is a term in heraldry most frequently found applied to animals of the deer tribe, but really applicable to all creatures having horns; and is used to describe the head when it is *affrontée* and cut off immediately behind the ears, so that no portion of the neck whatsoever is visible.

Cabot (properly CABOTO). 1. GIOVANNI, a notable voyager, was born at Genoa in 1420, and, coming to England, was employed by Henry VII. in the work of Atlantic exploration. On June 24th, 1497, he discovered Labrador, part of the mainland of the American continent. He died in 1498. 2. His son, SEBASTIANO, was born in 1473 at Venice, or, as some say, in 1477 at Bristol, where his father had settled; and in 1497 he accompanied his father on the voyage which resulted in the discovery of Labrador, and the exploration of the coast lines of Nova Scotia, Newfoundland, and Florida. He made another voyage, which was designed for the discovery of a passage to India, in 1498, and, after undertaking further expeditions, entered the service of Ferdinand of Spain in 1512. He soon, however,

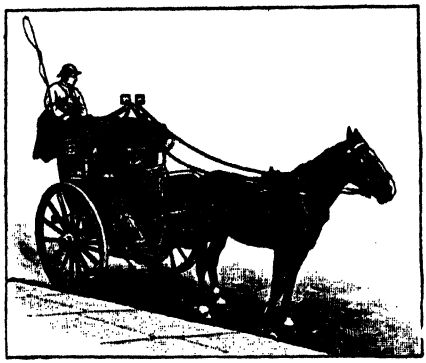
returned to England, and set out on a voyage during which he visited Hudson's Bay. Disgusted, apparently, at the treatment which he met with from his subordinates, he once more went to Spain, and, under the patronage of Charles V., examined the coasts of Brazil, and discovered San Salvador. In 1549 he again came to England, and was by Edward VI. made "Grand Pilot of England" and "Governor of the Mystery and Company of the Merchant Adventurers for the Discovery of Regions, Dominions, Islands, and Places Unknown." He suggested a voyage for the discovery of a north-east passage to China, and although this, which was undertaken in 1553, did not produce the desired results, it led to the opening of a very valuable trade with Russia. After an honourable and useful career, Cabot died in London about the year 1557. J. F. Nicholls (1869), and Hellwald (1871), have written his life, concerning which, however, remarkably little is known, if it be measured by the lasting value of his achievements.

Cabra, a Spanish town, about 28 miles S.E. of Cordova, and in the province of Cordova, and near the source of the river Cabra. The cathedral of the Assumption was formerly a mosque, and there are interesting Moorish remains. An abyss mentioned in *Don Quixote* is pointed out, and there remain parts of an old castle. The manufacture of bricks and pottery is carried on, and the neighbourhood abounds in wine. A good deal of linen, woollen, and hempen goods is manufactured.

Cabral (or CABRERA), PEDRO ALVAREZ, a Portuguese navigator, was born about the year 1460. In attempting to find a western passage to India, he sighted and was driven on the coast of Brazil on April 24th, 1500, and has some claims to be regarded as its discoverer, although similar claims are advanced on behalf of Pinçon. He afterwards voyaged to India, where he concluded, on behalf of Portugal, the first commercial treaty with the native princes. He also made discoveries on the African coast. He is supposed to have died in 1526. An account of his work will be found in Ramusio's *Navigazioni e Viaggi* (1563).

Cabrera, DON RAMON, COUNT DE MORELLA (1810–1877), a Spanish general, born at Tortosa in Catalonia. He threw himself with enthusiasm into the revolution which followed the death of Ferdinand VII., and entering a guerilla troop on the side of Don Carlos, he was soon made captain, and distinguished himself by his daring. General Mina put to death Cabrera's mother and sisters, whereupon Cabrera adopted a system of reprisals, and mercilessly slew every Christino he caught. [CARLISTS.] In 1838 he was made general, and Don Carlos created him Count of Morella for taking a fortress of that name. In 1840 he was driven across the French frontier, and was imprisoned for a time at Ham. When set at liberty he went to England, and was greatly opposed to Don Carlos' abdication in favour of his son. In 1848 he again tried to stir up Catalonia, Aragon, and Valencia, but the country was tired of the war, and a defeat in 1849 forced him to repass the Pyrenees. He went back to England and married an English lady, and did not after that meddle openly in Spanish politics beyond issuing a manifesto in 1875 inviting Carlists to submit to King Alfonso. A grim story is told by Captain Alexander Bath in *Seven Years in Spain*, which illustrates at once the cruelty of Cabrera and a certain sense of humour mingled with it.

Cabs (from French *cabriolet*, a diminutive of cabriole, the name being applied because of the bounding motion of the vehicle) were introduced into Paris about the middle of the 18th century, and speedily became very popular. About



HANSOM CAB.

1813 there were 1,150 of them on the stands at Paris. They were introduced into London in 1823, when Messrs. Bradshaw and Rotch obtained licences for twelve at a fare of 8d. per mile. These cabs ran on two wheels, and had a large leather hood for use in wet weather; the driver sat beside the fare. They speedily displaced the old hackney coaches, familiar from Dickens's earlier works, which were lumbering two-horse vehicles, plying at that time at a fare of 1s. per mile. These coaches had been introduced in 1623 under James I.; the first coach stand in London was established 1634, and though at first objected to by the Government they held their ground. Soon after the introduction of cabs the fare was raised to 1s. a mile, and the numbers speedily increased, first to 50, then to 100, and then the limit to those licensed was removed. The hansom, so called from its inventor, was patented in 1834. It was then a square body on a square frame, hung between wheels as high as itself, about 7 ft. 6 in. in diameter. This type was speedily improved on, and in 1836 a cab company was formed under a fresh patent. The improvements introduced by some of the London companies have encouraged their drivers to obtain more in "tips," and so forced up the hire of the cabs as to make it unremunerative—the usual system being for the driver to hire his cab by the day. Despite efforts to vary the type of London horse cabs only two have survived: the hansom or "shoful," and the brougham or "growler." The "tribus," the "brougham hansom," and others have been introduced, but failed to take, probably

because the fares are fixed by law at a uniform rate. While the hansom, in Lothair's words, is "the gondola of London," the "growler" has no merits, save, perhaps, its capacity for carrying luggage. In 1906 motor cabs were introduced into the Metropolis by several companies, and became popular within a short space of time. Their success, in a large measure, is due to the use of the taximeter, or fare register and distance recorder, by means of which the passenger can see at a glance the exact fare he has to pay. Both drivers and vehicles are licensed by the police authorities in London and in most provincial towns, and are under tolerably stringent police restrictions.

Cabul, a city of Afghanistan, lat. 34° 10′ N. and long. 66° 55′ E.; it is the capital of a province of the same name, and of the country, and is situated at the foot of the Takt-i-Shah and Amai hills at an elevation of about 6,000 feet above sea level. The mildness of the climate and the fertility of the soil make it one of the most agreeable cities of Asia, and it is noted for its fruits, especially apples, grapes, melons, pears, and pomegranates. The winters, however, are at times very severe, and snow lies upon the ground to the depth of several feet. The flat-roofed buildings are generally of two and three storeys high; and the town is divided into four by the main bazaar, whose streets diverge from the central square. On a spur of the hills south of the city is the citadel of Bala-Hissar, which formerly contained the royal palace, but is now abandoned. A mile north of that may still be seen the encampment where the British army lay in 1880, as also traces of the old encampment of 1839; and there is a British cemetery. Cabul has made much progress of late years in the way of constructing roads and in cultivation, and it is fast becoming an important station for Indian trade. Besides its trade in camel-hair cloth, carpets, cotton goods, silks, shawls, and skins, it is becoming a depôt for European goods. It is also noted for its horse market. The inhabitants are a mixed race—Afghans, Hindoos, and some Jews. The town began to play a part in modern history in 1739, when Nadir Shah took it and established a dynasty. Under Timour it became the capital in 1774; the English made war upon it and captured it in 1839, and in 1842 happened the celebrated massacre of the British army, when only one man escaped. In 1854 Dost Mohammed became an ally of the English, but later Shere Ali espoused the Russian cause and England put Yakoub Khan upon the throne. On the murder of Major Cavagnari, the British resident, Sir Frederick Roberts made his noted campaign of 1879–80, which ended in putting Abd-er-Rahman upon the throne, and the treaty of Gandamak which gave the English control of the Khyber Pass. The river Cabul rises at Sar-i-Chasma near the source of the Helmund, and flowing through the city follows a course generally S.E. of 270 miles and joins the Indus.

Cacao, the native name for *Theobroma Cacao*, and probably other species of this genus of tropical American Sterculiaceæ. They are small trees, natives of Mexico, Central America and the north of South America, cultivated also in Brazil, Guiana, Trinidad, and Grenada. *T. Cacao* has large oblong pointed entire leaves and sessile clusters of pentamerous flowers with rose-coloured calyx and yellowish petals. The fruit is yellow, from 6 to 10 inches long, and from 3 to 5 broad, oblong, blunt, with ten longitudinal ridges externally, and five chambers, containing ten or twenty seeds each, internally. The thick tough rind is almost woody. The seeds are dried, roasted, bruised, and winnowed, so as to remove their testa from the *cocoa-nibs* or cotyledons. These contain more than 50 per cent. of fat or *cocoa-butter*, part of which is generally removed in the process of "preparing" cocoa. It is used in making chocolate "creams." Cocoa is also so rich in albuminoids as to form a valuable article of food; contains a gently stimulating alkaloid *theobromine*, a fragrant essential oil and a red colouring matter. So-called "*soluble*" cocoas have starch added to them, which swells up in boiling water, but in no way dissolves the cocoa. Sugar and vanilla or other flavouring are added in the preparation of *chocolate*. These beverages have less stimulating action upon the respiratory and nervous systems than tea or coffee.

Caceres, the name of a Spanish province in Estremadura and of its capital. The province is noted for its cattle-rearing, and in the northern part a good deal of wine is produced. The city is 20 miles south of the Tagus, and 24 miles west of Truxillo, and has a bishop and fine episcopal palace, a college and a public school. There is a considerable trade in wool, and Caceres possesses fulling and oil mills, lime-kilns, soap-works, and tanneries, and in the neighbourhood are large gardens, fields, and pastures. There are some notable specimens of mediæval architecture among the houses, and the granite bull-ring is remarkable. The Romans and the Moors made much of the place, the former founding here their Castra Cæcilia; and the allied forces here defeated part of the Duke of Berwick's forces in 1706.

Cachalot. [SPERM WHALE.]

Cachar, a district of British India, adjoining Manipur, with chief town Silchar. It is a great rice and tea producing district, and supplies about a quarter of the tea exported from Assam, whose chief commissioner administers the district. It also exports much timber to Bengal from its extensive forests. Cachar has an area of 3,750 square miles.

Cache, a hole made in the ground for the reception of provisions or other articles found to be incumbrances on an expedition.

Cachet, LETTRES DE, in France, were so called in contrast to letters patent (which were open), and were sealed letters signed by the king and countersigned by a secretary of state. They were expressions of the personal will of the sovereign, and for the last two centuries before the revolution were employed (*a*) to direct certain political bodies to discuss particular subjects, (*b*) to send persons to exile or prison, which could be done by a simple expression of the royal will without trial. It is this

latter use of them which is best known. They were freely used after the edict of Nantes to break up Protestant families and so make proselytes, while at some periods they could easily be obtained signed in blank, and so were often used to gratify private ends. The system was violently condemned by Voltaire, and was finally abolished during the Revolution by a law of January 15, 1790.

Cachexia signifies, literally, bad habit, and is a term applied to the unhealthy condition of body which develops in certain chronic maladies. Thus a patient is said to be the subject of gouty, cancerous, or malarial cachexia, and the like.

Cacodyl, a compound of arsenic, carbon, and hydrogen, of composition $As_2(CH_3)_4$. It is a spontaneously inflammable liquid, boiling at 170° C. It has a powerful irritating odour (hence its name from the Greek, *kakos odein*), and, like most of its derivatives, is very poisonous. A mixture of this substance with its oxide $As_2(CH_3)_4O$, obtained by distilling potassium acetate and arsenious acid, is known as *alkarsin*, or *Cadet's fuming liquor*.

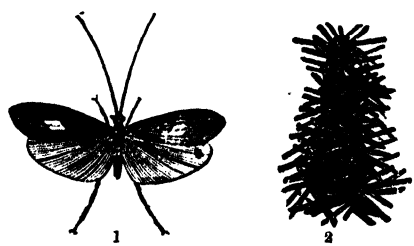
Cacongo, or KAKONGO, a territory mostly belonging to the State of Congo, along the Atlantic coast immediately north of the mouth of the river Congo, in 5° south latitude. Its capital is Kinguela, and its inhabitants carry on a considerable trade from the ports of Mallemba and Cabinda.

Cactus, the general name in popular use for the 800 species of the order *Cactaceæ*, which are now referred to 18 genera. They are a somewhat isolated group of calycifloral dicotyledons, almost all natives of America, inhabiting the dry regions of the south-western United States, Mexico, Peru, and the Andean plateaux. They are succulent shrubs with stems either flattened and leaf-like, spherical, or polygonal and columnar; and their leaves are represented by spines grouped in clusters or undeveloped branches. They have a watery juice, in which they differ from the milky spinous Euphorbias that occupy similar situations in Africa. Cacti have large sessile flowers with indefinite sepals graduating into the petals, which are also numerous, as are the stamens. The ovary is inferior and one-chambered, with numerous seeds on parietal placentas, and forms a succulent fruit. Several species have been introduced into Southern Europe and the East, especially the prickly pear (*Opuntia vulgaris*) and the nopal (*Nopalea coccinellifera*), the food of the cochineal insect (*Coccus cacti*).

Cacus, an Italian brigand, who, "once upon a time," lived in a cave on Mount Aventine, and lived by robbing the shepherds and herdsmen of the neighbourhood. But one day he caught a Tartar in the shape of Hercules. This hero was returning from doing a little robbing on his own account, and was bringing home Geryon's cattle from Spain. As Hercules took his siesta, Cacus came down on the cattle and carried off some of the best of the heifers. Being a sort of classical Eulenspiegel, he dragged the heifers in by the tails in order that their steps might seem to be going out; but as Hercules was starting some of the oxen lowed, and the heifers answered and so betrayed their whereabouts. Hercules forced his way into the cave, slew Cacus, and retook his heifers. Cacus is also represented as a giant, son of Vulcan, breathing out flames, and possessed of a sister Caca. Some have tried to give the pair a historical or mythological signification, but to do so seems like trying to fix the identity of, or give a mythological meaning to, Jack the Giant Killer.

Cadastre (Low Latin, *capitastrum*, a register on which a poll-tax was based), a register of the landed proprietors of a district, with the extent of their estates, as a basis for taxation. Such registers are kept in most countries of modern Europe, though not in the United Kingdom, and are illustrated by careful "cadastral maps." In England the comparative unimportance of the land-tax has prevented their need being felt. Their existence, however, greatly cheapens and facilitates land transfer.

Caddis Flies are an order of insects known as the *Trichoptera;* they mainly belong to one family, the *Phryganidæ*. The main features of the order are these: the metamorphosis is incomplete, but the pupa is active for part of its life; the masticatory organs around the mouth are mainly rudimentary in the adult but not in the pupa or chrysalid stage; and there are four wings which are all equal or



CADDIS FLY.
1, Perfect insect; 2, Larva, in case.

nearly so; the hinder pair may be hairy or folded. One of the best known characters of the group is that the larva lives in a tube composed of fragments of sticks, shells, and sand; these tubes float about on the surface of ponds and streams. The "indusial" limestone of Central France is said to be composed of these cases (*indusia*) of Caddis flies. *Phryganea grandis* is the commonest English species; the adult is a brown insect measuring two inches across the wings.

Caddo (CADODAQUINON), a large North American nation formerly occupying parts of Arkansas, Louisiana, and Texas; later (1825) concentrated on the Red River, Louisiana, whence the parish of Caddo; now removed to the Brazos river below Fork Belknap, south-west Texas. The Caddoes appear to be remotely allied to the Pawnees through the Wichitas and Rickarees. Chief branches: Nandakoa, Tachie, Aliche, Nabedache, Jonie.

Cade, JACK, the Kentish leader of an insurrection in 1450, when, assuming the name of Mortimer, and leading an army of 15,000 to Blackheath, he opened communication with the citizens,

some of whom favoured his enterprise, and called on Henry VI. to redress the grievances the people complained of and to dismiss his advisers. After retreating before the army sent against him, he gained a partial victory, and advanced on London, where his men murdered Lord Say. Dispersing upon a promise of pardon, the insurgents left Cade to his fate, and in attempting to escape to the coast he was killed by Alexander Iden at Heathfield in Sussex. Writing in the next century, Shakespeare probably represents faithfully the facts as handed down by tradition, and gives us a graphic picture of both the tragic and the humorous aspects of the insurrection.

Cademosto, ALOYS DA (1432–1480), a Venetian explorer, who examined the Mediterranean and Atlantic coasts, and made in 1455 a voyage of discovery to the Canaries and to the mouth of the Gambia. The next year he made another expedition to the Senegambia, and at the death of the Spanish Infante Henry, his patron, he returned to Venice. An account of his voyages was published in 1507.

Cadence, in *Music*, a sequence of chords forming the close of a phrase; the term is generally limited to the two last chords. There are various kinds of *cadences*, the principal being the *perfect*, the *imperfect*, the *interrupted*, and the *plagal cadences*. The *perfect* or *full cadence* was formerly the most frequently employed, but of late years a tendency towards an almost complete avoidance of this form has manifested itself.

Cadency, THE MARKS OF. Closely following upon the introduction of heraldry, and coeval with the commencement of its existence hereditarily, came the necessity of distinguishing between the different branches of a family and of marking the arms of the younger sons. Some of the earlier ways of "differencing" arms were by changing (frequently reversing) the colours of the charges or the field or both, by adding to the number of the charges on and outside the "ordinaries" appearing upon the shield, by adding a bordure, or by elaborating the lines of partition. The label as a mark of cadency is certainly by far the oldest of those which are now in use, but with regard to the olden time, different writers have recited such varied rules for observance that it would be of but little advantage to quote them here; and the present officially recognised series are of comparatively modern origin. These are for the eldest son a label of three points (borne during the lifetime of his father; and for the eldest grandson in like manner a label of five points), for the second son a crescent, for the third son a mullet, for the fourth a martlet, for the fifth an annulet, for the sixth a fleur-de-lis, for the seventh a cinquefoil, for the eighth a cross moline, for the ninth a double quatrefoil (*i.e.* of eight leaves). There are no special laws regulating their colour or position, and the tinctures and disposition of the arms are taken into consideration. They are never depicted of any great size. When the name and arms of a family are assumed by royal licence without any blood relationship, other differences (readily recognised) are introduced, frequently a canton upon the arms and a cross crosslet upon the crest. In Scotland different rules hold good. There the first junior branch of a family has a plain bordure added to the paternal coat, but all subsequent alterations to denote the cadency of the various branches are made in or upon the aforesaid bordure. In England the officials of the Heralds' College do not encourage the too frequent use of these marks, as tending rather to confusion than distinction when they become surcharged one upon the other; and (save and with the exception of marks to indicate the lack of relationship which must always be retained) a junior branch, for instance, assuming a double surname and coat-of-arms discontinues all previous marks of cadency, and starts afresh. The Royal Family are not governed by the foregoing rules. The Prince of Wales, as the eldest son of the Sovereign, bears upon his arms'-crest and supporters a plain label of three points argent; and all other members of the Royal Family are in addition also distinguished by a label argent of three or five points, each specially differenced under a separate royal warrant by charges upon one or more of the said points of the label.

Cadenza, in *Music*, an ornamental flourish introduced by the author or soloist into some portion, generally the end, of a concerto or aria. It is always intended to display the technical powers of the executant, and its form used always, at one time, to be left by the author to the performer.

Cader Idris, a mountain of Wales, in Merionethshire, five miles from Dolgelly, is a broken ridge of about ten miles long, and one to three broad, and reaching at its greatest elevation a height of 2,900 feet. From the summit is a fine view. The Wrekin in Shropshire may be seen, and a wide stretch of St. George's Channel almost to the Irish coast.

Cadet (*i.e. younger*, orig. dimin. of Latin *caput*, a head), originally a younger son, in the 18th century a gentleman volunteer in the French army (who entered hoping to win a commission by his services), now applied in England to the students in the *Britannia* training ship, to the youngest officers in the British navy who are not yet rated as midshipmen, and to the students at the military colleges at Sandhurst and Woolwich. A British naval cadet receives pay after leaving the *Britannia*, at the rate of 1s. per diem. Regulations concerning the admission and education of cadets will be found in the official quarterly *Navy List*.

Cadet's Liquor. [CACODYL.]

Cadi (an Arabic word), a judge in civil cases in Moslem countries, familiar in the *Arabian Nights* and other Eastern tales.

Cadiz, a town of Spain, capital of the province of Cadiz, and situated at the north-west extremity of the Isle of Léon in the Bay of Cadiz. The town is on a rock forming a tongue at the end of the island, and separated from the rest of the island by a channel crossed by a drawbridge and a railway bridge, and is well fortified. The bay of Cadiz has, beside the port of Cadiz, that of Caracca, where there are fine government dockyards, and it

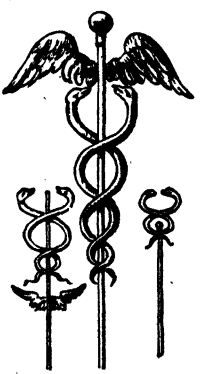
affords a fine anchorage, being protected by the neighbouring mountains. Not only is Cadiz the most elegant and agreeable city of Andalusia, but also the first military port of Spain, and ranking second only to Barcelona as a commercial port. The industries of Cadiz are not of great importance, but the importation of produce from the Spanish colonies and elsewhere is considerable. The chief exports are cork, fruits, lead, olive oil, salt, wine, and tunny. Nearly 4,000 ships enter the port annually with a tonnage of considerably over a million, but a great proportion are foreign. The houses of Cadiz—gleaming white and relieved by vermilion streaks which mark the separation of the houses and the division of the storeys—the projecting balconies, and the terraces, present a pleasing appearance. The town is well paved and lighted, and the streets, though narrow, are regular. The squares are well planted with trees, and on the ramparts at the north of the town is a fine promenade called the Alameda, which commands a view of the whole harbour. The public buildings are of no great interest. The ancient cathedral has some pictures of Cornelis Schut, and a good altar-piece; while in the new cathedral there is an elegantly-proportioned and well-decorated chapel, and a remarkable vaulted crypt, and a few pictures and statues, of which the best is a *Conception*, by Clemente de Torres. Cadiz is seven miles from Xeres, and about fifty from Gibraltar. Founded by the Tyrians, and becoming successively Carthaginian and Roman, the city belonged to the Visigoths and then to the Khalifate of Cordova, from which the Spaniards took it in 1262. It was burnt by the English in 1596.

Cadmium (Cd; at. wt. 111·7), a white, soft crystalline metal, sp. gr. 8·6, which is frequently found associated with zinc in the ores of this metal. It melts at 315° C., and, being more volatile than zinc, is found in the portions of the metal which distil over first when the ores are heated with charcoal. It dissolves slowly in dilute acids and forms salts, as Cadmium Chloride, $CdCl_2$, etc. The sulphide CdS is an insoluble yellow powder, occurring native as *Greenockite*, and is employed as a pigment.

Cadmus, in Greek mythology, son of Agenor and Telephassa, and brother of Europa. When Zeus carried off Europa Agenor sent his sons to look for her, but in vain; and Cadmus with Telephassa settled in Thrace, where the latter died. Then Cadmus went to Delphi and was told by an oracle to follow a cow and build a town where the cow should sink down. Cadmus followed the cow to Bœotia and built Thebes. Wishing to sacrifice the cow to Athene, he sent for water, and a dragon killed his messengers. Cadmus killed the dragon, and by Athene's advice sowed its teeth, which sprang up armed men, who fought and killed each other, all but five, who became the ancestors of the Thebans. Later, Cadmus with his wife Harmonia, left Thebes, according to one account, and led a hostile expedition of Encheleans against it, by which he was made king. Both were finally changed to dragons, and taken up to heaven.

Cadoudal, GEORGE (1771–1804), celebrated leader of the French Royalists (the Chouans) and conspirator. The son of a Breton farmer, he took part in 1793 in the Vendéan rising, and soon became captain. After many changes of fortune he gave in his submission to General Hoche in 1796; but in 1799 he was again in arms, and again submitted in 1800, at which time Napoleon is said to have made efforts to gain him over to himself. But he went to England and was made much of by the Royalists. Unable again to rouse Brittany, he began to intrigue in Paris, and sent Saint-Régent as his agent; but denied all connection with the latter's attempt to assassinate Napoleon. Joining in another plot with the Count d'Artois and with Pichegru, which had for its object the kidnapping of Napoleon, he went to Paris in 1803, and after successfully keeping hidden for six months, he was arrested in March, 1804, and having avowed his intention of overturning the Government and putting Louis XVIII. on the throne, he was guillotined with eleven others in June, 1804.

Caduceus, the Latin name for the staff of Mercury, whom the Romans identified with the Greek Hermes. It was represented with a pair of wings at the top—to symbolise the speed with which the messenger of the gods travelled—and two serpents twined round it: either because, according to a legend, the god had once separated two serpents with his staff, or as a symbol of his wisdom, or of health (the serpent being sacred to Æsculapius). In modern times, Mercury being in one aspect the god of markets, the caduceus is sometimes the symbol of commerce.



CADUCEUS.

Cæcilia, the type-genus of a family (*Cæciliidæ*) of worm-like Amphibians, containing several genera and about 30 species, from the Neotropical, Oriental, and Ethiopian regions, and differing from all the rest of the class in possessing no limbs at any stage of their existence, though minute rudiments of posterior limbs have been observed, and in the external resemblance to the burrowing snakes and to the limbless lizards of the genus Anguis, whence they are sometimes incorrectly called "blind-worms." But their Amphibian character is established by the character of the skull, and by the presence of gills in the immature forms. The tail is not distinguished from the body, and in the soft skin tiny scales are embedded, giving the body the appearance of being composed of a series of rings. The maximum length is something less than 2 feet; the mode of life is subterranean, and the diet consists of insects and worms.

Cædmon, an Anglo-Saxon poet of the seventh century, of whose life we know little beyond what is told us by the Venerable Bede. According to this account it was not till of mature age that the

spirit of poesy came upon him, and that he was exhorted in a vision to "sing the beginning of created things." He was then taken to the monastery of Whitby, and he devoted his life to composing poetry upon the history contained in the Bible. Of his paraphrase one MS. copy of the tenth century is in the Bodleian, and some of it may be really his work. But many doubt even his existence, and think that his name may have been given to a collection of poems by different authors, and that his name even does not denote one particular man.

Caen, a French town, capital of the department of Calvados in Normandy, and head of arrondissement, at the junction of the Odon and the Orne, 149 miles from Paris and 83 from Cherbourg. The junction of the rivers forms a port, consisting of a basin, which communicates with the railway from Paris to Cherbourg, and is connected with the English Channel by a canal. Caen imports chiefly Norwegian timber, corn, salt, coal, iron, wine, and colonial produce, and exports the produce of the country round, and materials for ship-building. A good deal of lace is manufactured in the town. There are four dockyards, and the ships of three or four hundred tons, built at Caen, are much esteemed. Caen is in a pleasant valley, and is well built, well laid out, and clean, and has fine public buildings. The only remains of the old fortifications are King William's tower and a kind of citadel called "The Castle." The most noted of its churches is that of St. Etienne, founded in 1064 by William I. of England. In the choir of this church is a slab of blue stone with Latin inscription, which marks the spot where some of the remains of William the Conqueror still lie. Another interesting church is that of Holy Trinity, called "L'Abbaye aux Dames," founded by Queen Mathilde in 1066. The Abbess of this convent had special privileges, one of which was that she was called Madame de Caen. There are some magnificent old houses in Caen; and the sixteenth century Hôtel de Ville has a fine library. The museum has a fine collection of paintings, the best of them being, perhaps, Perugino's *Marriage of the Virgin*. There are also pictures of Paul Veronese, Leonardo da Vinci, Rubens, Ruysdael, and many other noted painters. Charlotte Corday lived at Caen, but her house is now pulled down.

Caerlaverock, a ruined castle seven miles from Dumfries, and situated near the mouth of the Nith. It possesses some historical interest, as having been captured by Edward I. in 1300. For four centuries it has been the property of the Maxwell family. Readers of Scott are interested to know that Robert Paterson, the original of *Old Mortality*, is buried in the churchyard there.

Caerleon, a little old town of Monmouthshire, on the right bank of the Usk, and between 2 and 3 miles from Newport. It is the Roman *Isca Silurum*, the ancient capital of Britannia Secunda, and afterwards it became the capital of Wales. Besides the Roman remains of all kinds which are found in great abundance, there are the remains of an amphitheatre, which are called "The Round Table," or "Arthur's Table," since it was here that Arthur founded the famous Order, according to Geoffrey of Monmouth and Tennyson. Pop. (1901), 1,367.

Caermarthen, a parliamentary and municipal borough, assize-town, and head of quarter sessions, is the capital of Caermarthenshire, and forming a county by itself, is prettily situated 5 miles from the sea, on the right bank of the Towy, which is navigable for small vessels, but is not much used, owing to the greater convenience afforded by Llanelly. The trade consists chiefly in the export of slate, lead ore, and tinplate, and farm produce, and there is salmon and trout fishing in the river. The parish church of St. Peter has some interesting monuments, and Sir Richard Steele is buried there. There are memorials to Generals Picton and Nott, who were natives of the town, and to those officers and men of the Welsh Fusileers who fell in the Crimean war. The town is united with Llanelly for the return of one member to Parliament, and has a market twice a week. Pop. (1901), 9,935.

Caermarthen, COUNTY OF, a county of South Wales, having Cardigan on the N., Caermarthen Bay on the S., Brecon and Glamorgan on the E., and Pembroke on the W.; about 40 miles long by 24 broad, with an area of 947 square miles, being the largest county of Wales. The Black Mountains, with the Caermarthenshire Van of 2,600 feet high, occupy the S.E. of the county, and the rest of the county is of a varied and undulating character with beautiful valleys and glens. The chief river is the Towy, which receives the Gwili and Cothi, and falls into Caermarthen Bay, and is noted for its beautiful valley. The Taf, also flowing into Caermarthen Bay, drains the west of the county, and the Teify separates Caermarthen from Cardigan, and the lower course of the Llwchwr separates it from Glamorgan. Geologically, the north of the county is of silurian formation, next to which succeeds a belt of old red sandstone, followed by belts of carboniferous limestone and millstone grit, while south of this the county forms part of the South Wales coal field. Except in the higher parts, the climate is mild, but the rainfall is great, and agriculture is comparatively backward, partly owing to the marshy nature of much of the soil and the defective drainage. The large valleys and the southern parts are the most fertile. The chief industry is agriculture and stock-raising; but the coal and iron and lead mines and the limestone quarries also employ a considerable number of people. The population is mostly Welsh-speaking, and the manners and customs of the people, especially in the northern parts, are purely Welsh. Each of the two divisions sends a member to Parliament. The county is well served by railways, the main line from Bristol to Milford Haven running through it, besides branch lines in different directions. There are many Roman and British remains in Caermarthen, among them being traces of the Julian Way and two other Roman roads. The ruins of Carreg Cennin, and Dynevor castles are also interesting. The county was the scene of much of the struggle between Llewelyn and Edward I., and it was here that the celebrated Rebecca riots of 1843 first broke out. Pop. (1901), 135,325.

Caernarvon, a parliamentary and municipal borough, assize town, and head of quarter sessions, capital of Caernarvonshire, on the E. shore of Caernarvon Bay, at the mouth of the little river Seoint. Beyond some brass and iron founding there is little manufacturing in the town, but the port has a trade in slates, stone, and copper ore, and a great many summer visitors resort hither for sea-bathing and for the scenery of the neighbourhood. Caernarvon is near the site of an old Roman station, and was the former seat of the Prince of North Wales. Hugh Lupus, Earl of Chester, fortified it in 1098, and the castle, which now forms one of the finest ruins in the kingdom, was begun in 1284, and common tradition says that Edward II. was born, if not in the newly-begun castle, at least in the town. The castle, which stands on the west side of the town, occupies an irregular oblong of about three acres, and its walls are many feet thick. There are thirteen embattled towers, and the main gateway was defended by four portcullises. Part of the walls of the town and some of the gateways still exist, but the town has overflowed them, and they are now inside it. Many Roman remains have been found at the Roman station abovementioned, and on the left bank of the river are the thick-walled remains of a Roman fort. Caernarvon unites with the Bangor group of towns to send one member to Parliament. Its weekly market is held on Saturday. Pop. (1901), 9,760.

Caernarvon, COUNTY OF, a maritime county of North Wales, having Beaumaris Bay on the N., the Irish Sea and Menai Straits on the W., and Cardigan Bay on the S.W., and bounded on the E. and S.E. by Denbigh and Merioneth, 55 miles long by about 23 miles broad, and having an area of 579 square miles. Nearly one-half of it forms a spur of from 5 to 9 miles wide, projecting into the Irish Sea and forming Caernarvon Bay on the N., and Cardigan Bay on the S. It is the most mountainous county of Wales, and its mountain scenery is the grandest to be found in South Britain. The Snowdon range occupies the centre of the county, and there are many lofty and well-known peaks varying in height, from Snowdon itself (3,570 ft.) to the Drum (2,527 ft.). The valleys, too, are very beautiful, some of them being rugged and wild, like the gorge at Pont Aberglaslyn, and others soft and peaceful like Nant Gwynant. The vale of the Conway, and those of Beddgelert and Llanberis have a world-wide reputation. Great Orme's Head is the bluff and bold termination of a narrow belt of carboniferous limestone, which runs along the coast of the Menai Strait. Among the minerals of Caernarvon are lead, copper, and a certain amount of gold, while the slate quarries are of great extent and value. The rivers of Caernarvon are not of great importance, the chief being the tidal Conway, which, after separating Caernarvon from Denbigh, flows into the sea at Conway, and is navigable for about 10 miles above that town. The lakes and mountain tarns of the county are numerous, and some of them of considerable size. The climate, except on the coast, is severe in the winter; and agriculture, partly owing to the nature of the country, partly to the great mining industries, is in a backward state. Dairy and sheep-farming are the chief pursuits of those not engaged in mining, and on the mountains is reared a breed of ponies which are much sought after. The Chester and Holyhead railway line runs along the northern coast, and crosses the Menai Strait to Anglesey by the celebrated tubular bridge, called the Britannia Bridge. The county returns one member to Parliament. The principal towns are Bangor, Caernarvon, Pwllheli, and Llandudno. The mountainous nature of the county eminently fitted it to be what it was —the great stronghold of the inhabitants against their invaders, from the time of the Romans down to that of Edward I. Pop. (1901), 126,835.

Cæsalpinus, the Latinised name of Andrea Cæsalpino, an Italian natural philosopher, born at Arezzo, in Tuscany, in 1519. A pupil of Ghinus of Bologna, he became botanical professor at Pisa, where he also studied anatomy and medicine. In 1592 he went to Rome as physician to Pope Clement VIII., and died there in 1603. He published *Speculum Artis Medicæ*, *De Plantis, libri XVI.* (1583), *De Metallicis* (1596) and *Quæstionum Peripateticarum, libri V.* (1603). In the first of these he first speaks of inhibitory action and pulmonary circulation, though he made so little, if any, advance upon Galen's teaching that he has no claim to be considered as anticipating Harvey. His botanical work is far more important. He recognised the existence of sex in what we now term dicœcious plants, such as the date, yew, nettle, and hemp; and not only described some 800 plants, but made such suggestions as to their classification as to be styled by Linnæus "*primus verus systematicus.*" He divided them first into trees and herbs, and then subdivided them naturally, *i.e.* by various characters, especially by the number of chambers to the fruit, whether it is superior or inferior, the number, etc., of the seeds and the position of the radicle and cotyledons. His herbarium is preserved at Florence.

Cæsar, the name of a family of the Julian *gens*, which claimed, as Virgil tells us, to be descended from Iulus, the son of Æneas. Although not strictly appertaining to the emperors later than Nero, it was adopted as part of the imperial title, and from the time of Hadrian became the distinctive title both in the Eastern and Western empires of the heir-apparent. The title still exists in the names of the Czar of Russia, the German Kaiser, and the British Kaiser-i-Hind.

Cæsar, CAIUS JULIUS (100 B.C.–44 B.C.), general, triumvir and dictator of Rome, and man of letters. The son of a prætor, his connection by marriage made him espouse the cause of democracy, and he lived chiefly abroad till 74 B.C., when he became a leading spirit in the democratic party. After filling many important state offices, he formed with Crassus and Pompey the first Triumvirate in 60 B.C., being at the same time consul. He used his consulship chiefly to advance his friendship with Pompey, to whom he gave his daughter Julia in marriage; while he cemented a friendship in another direction by

marrying Calpurnia, the daughter of Piso, the consul who succeeded him. The government of Gaul and Illyricum, to which he was appointed when ex-consul, gave him the opportunity of proving his great military genius and of training a powerful and devoted army, and 58 B.C. saw him enter upon that nine years' career of conquest which subdued most of Western Europe to the Roman yoke. His first campaign resulted in the defeat of the Helvetii, and the second in the breaking-up of the Belgic Confederacy, for which the senate decreed a fifteen days' thanksgiving. At a meeting in the interval with Pompey and Crassus a common policy was agreed upon, and it was arranged that Cæsar's government of Gaul should be prolonged to 49 B.C. His third campaign almost finished the subjugation of Gaul, and in his fourth he attacked the Germans, crossed the Rhine, and remained eighteen days on the farther bank. In this year (55 B.C.) he made his first descent upon Britain, following it up in 52 by another, from which he retired virtually discomfited. An insurrection on the part of the Gallic tribes was finally put down, and in 51 the conquest of Gaul was sufficiently complete and permanent to enable him to turn his attention to home affairs, which thenceforward engrossed his attention. Of his two colleagues, the one—Crassus—was dead, and Pompey, whose wife Julia had died, had joined the aristocratic party. At the end of his period of government Cæsar was ordered to give up his command, and the senate called upon Pompey to declare war against Cæsar as an invader if he should delay to disband his army. In January, 49 B.C., Cæsar crossed the Rubicon, and thus entered on the third phase of his career, not more than fifteen months of which he spent in Rome, and which culminated in his murder in March, 44 B.C. He did not march upon Rome, but made Central Italy his object, and pursued Pompey to Brundisium, but could not prevent his retreating with his army to Greece. In March he entered Rome, the acknowledged master of Italy. In 48 B.C. he routed Pompey at the battle of Pharsalia, and he was appointed dictator for a year and consul for five years, and the tribunitian power, which rendered his person sacred, was bestowed upon him for life. After his stay at Alexandria with Cleopatra, and the defeat of a son of Mithridates at Pontus, and that of Scipio and Cato at Thapsus, he came back to Rome, and as dictator feasted the whole city during four days of triumph for Gaul, Egypt, Pontus and Africa, his car being followed by Vercingetorix the Gaul, Arsinoe, the sister of Cleopatra, and the son of Juba, king of Mauretania. He was made *præfectus morum* and *princeps senatus*, his effigy was struck upon the coins, and the title of *imperator* was made a permanent addition to his name. He was embarking upon a career of usefulness and of far-seeing statesmanship and political and economic reorganisation, when his assassination cut all his schemes short. Shakespeare leads us to half-pity, half-admire Brutus the conspirator, but Dante, no mean lover of liberty, puts him along with Cassius and Judas Iscariot in the lowest depths of hell. As a writer, Cæsar's claims are eclipsed by his greatness as a general and a ruler, and most people perhaps look on him in this respect as did the schoolboy who said he was a man who wrote classics for the lower forms of schools. But his writings are terse and vigorous as becomes a soldier's despatches; they have all the vivid interest raised by an accurate observer and graphic describer, and recent researches —especially in North Belgium—have shown the fidelity of his narrative in many minor details.

Cæsarea, or KAISARIEH, a former Mediterranean sea-port on the coast of Syria, 30 miles north of Joppa, named in honour of Cæsar Augustus by its builder Herod about 22 B.C. The harbour was protected from the prevailing storms by a mole, and afforded a good anchorage. After the fall of Jerusalem it became the capital of Palestine. Eusebius, the Church historian, was Bishop here in the 4th century; and the Crusaders built a cathedral. It is now a heap of ruins, with a few fishermen's huts among them. Another Cæsarea, called also Cæsarea Philippi, was situated near the head waters of the Jordan, and the name was applied to other places, including the island of Jersey.

Cæsarean Operation, the removal of the child by incision in the middle line of the abdomen of the mother, a procedure sometimes attempted when delivery by the natural passages is rendered impossible (from pelvic deformity, or the encroachment of solid tumours), or when the mother's recovery is despaired of and the child lives, and rapid delivery cannot be effected by any other means. The term is derived from the Latin *cædo-cæsus*, I cut. Many of the supposed references to the operation in ancient literature are of doubtful authenticity, and the derivation of the name Cæsar from it is quite unwarranted. The risk to the mother in performing the operation is very great, but, thanks to antiseptic surgery, by no means so considerable as in former days.

Cæsium (Cs.; at. wt. 132·7; sp. gr. 1·88), a metallic element closely allied to the alkali metals sodium, potassium, etc. [ALKALI.] It never occurs free, and its salts, though widely distributed, are only found in small quantities; amongst other sources, in mineral waters, saltpetre residues, ashes of plants—especially tobacco. It is silver white in colour, soft and ductile, and decomposes water very readily. It is best detected by the spectroscope, giving two fine lines in the blue.

Cæsura (Latin, *a cutting*), the division of a metrical foot between two words. Such divisions must occur in certain places, by the laws of most Greek and Latin metres—in the third foot in a hexameter, in the fourth in an iambic line. As an illustration, in a line from one of the *Attempts at Classic Metres in Quantity*, published many years ago by Lord Tennyson—

Hexame | ters no | worse than | daring | Germany | gave us |

it would be a violation of classic rule if the two syllables which compose the third foot, "worse than," were one word or part of one word.

Caffeine, or THEINE, the active constituent of tea and coffee, in which it occurs to the extent of

about 3 and 1·3 per cent. respectively. It was discovered in coffee by Runge in 1820, and in tea by Oudry in 1827. It has the composition $C_8H_{10}N_4O_2$, and is closely allied to theobromine, the corresponding constituent of cocoa. It forms silky needle-like crystals, slightly soluble in water and alcohol. In large doses it acts as a poison. As a medicine, citrate of caffeine is a powerful drug which must be administered with caution. It is a very valuable remedy in certain cases of dropsy and of heart disease. It is also employed as a stimulant, and in cases of headache, particularly in hemicrania or megrim. The dose is 2 to 5 grains for an adult.

Cagayan, a numerous branch of the Tagala nation, Philippine Islands; they occupy the province of Cagayan, named from the Rio Grande de Cagayan, in the northern part of Luzon. Divisions: Ibanag, Itanes, Idayan, Gaddan, Ibano, Dedaya, Apayas, Malaneg—population about 115,000, nearly all Christians.

Cage-birds, a comprehensive term for birds kept in cages or aviaries for their power of song, or talking, or for the beauty of their plumage. The practice of keeping cage-birds is of high antiquity. Frequent references thereto occur in Oriental legend, notably in the *Arabian Nights*; and it is recorded that Alexander the Great kept a parakeet (*Palæornis torquatus*). The principal British cage-birds are the blackbird, blackcap, bullfinch, chaffinch, goldfinch, lark, linnet, nightingale, redpoll, siskin, starling, and thrush. Doves are sometimes kept, but their monotonous cooing renders them undesirable chamber birds, and the magpie and jay are oftener seen caged in the country than in town (though at the time of writing there is a fine male jay in a cage outside a shop in a small street in London). The jackdaw and raven, though often kept as pets, generally enjoy too much liberty to come under this denomination. The most important foreign cage-birds are those of the parrot family; then come the canary—which breeds so readily in domestication as to have little claim to be considered foreign; the generally brilliant-plumaged Oriental finches, for which the Jardin d'Acclimatation in Paris is so famous; the crossbill, the minah, the orioles, etc. For a description of all these the reader is referred to their popular names. Little can be said here as to the treatment of cage-birds. For information on this subject reference must be made to special treatises. It should, however, be borne in mind that overfeeding is as bad for birds as for their masters; and that more pets die from too much attention than from too little.

Cagliari, the capital of Sardinia, and chief town of the southern provinces, is situated within a bay formed by Capes Carbonara and Pula, of great commercial importance and forming a good harbour. It is the chief port of Sardinia, and has most of the export trade of the island, which consists of cork, corn, fruit, lead, oil, wine, and salt, which is furnished abundantly by evaporation from the salt marshes near the town. Cagliari lies on the slope and summit of a hill rising from the bay, the castle, the cathedral, the vice-regal palace, and most of the public buildings being on the upper part of the hill, while the slope is occupied by the Marina, with the residences of the commercial portion of the community. Stampace, to the west of the castle district, and Villanuova to the east, consist of narrow, irregular streets. The university, founded 1596, has a good library. The cathedral (fourteenth century) has an eighteenth century front; and among the many other churches and convents, the Capuchin monastery is interesting for its remains of Roman reservoirs. The town occupies the site of an ancient Carthaginian city, which after the first Punic war became Roman, and very many remains testify to its importance during this period. A Jewish colony, founded by Tiberius, remained there till 1492 A.D., when they were expelled by the Spanish. The town has been once bombarded by the English and once by the French.

Cagliostro, ALEXANDRE COMTE DE (1743–1795), a celebrated charlatan and quack, who made so great an impression upon his contemporaries that Goethe made a journey to Palermo in order to study him, and embodied his observations in a romance called *The Grand Cophte*, and Lavater also travelled to Bâle to see him. Cagliostro's real name was Joseph Balsamo, and, born of poor parents at Palermo, he became in youth a member of the Brotherhood of Mercy, and learnt something of medicine there. Expelled from the Order, he entered upon the career of magician and finder of hidden treasures. He began by swindling a goldsmith out of a quantity of gold, and he also committed some forgeries, and then disappeared to travel under many *aliases*, and contrived to make many dupes by his audacity, his pretensions, and his medical cures, real or pretended. Coming to Rome, he married a beautiful Roman woman—Lorenza Feliciani—who by her beauty and cleverness was of the utmost service to him in his undertakings. In Malta he met the sage Althotas, whose disciple he became, and in 1780 we find him at Strasbourg, and laying claim to supernatural gifts. He claimed to have lived in the time of Christ, and to have prophesied the Crucifixion. In 1785 he was at Paris, where he inaugurated a system of Egyptian freemasonry, to which women were admitted, which had for its object the physical and moral regeneration of its adepts. For the former Cagliostro promised to them the discovery of the *primary matter* and the *acacia*, which should bestow perpetual youth and health. But the affair of the queen's necklace caused his imprisonment in the Bastille. After his acquittal and liberation he was exiled to England, and began again his travels about Europe. In 1789 he was again in Rome, where he was condemned to death by the Inquisition, a sentence which was commuted into imprisonment for life. At the same time his wife was condemned to perpetual seclusion in a convent. A French writer says of him:—"If we strip Cagliostro of his white plume, his gold lace, and his glittering spangles . . . if we take from the picture its magic frame, what remains? Not a supernatural being, but a

man endowed with rare moral energy, gifted with fascinating, irresistible eloquence, and profiting by a knowledge acquired by long travels, numerous observations, and patient laborious study." One great instrument by which Cagliostro obtained dupes was the generosity with which he threw sprats to catch whales, an instrument which some of us have seen largely employed recently by a modern—*sed longo intervallo*—Cagliostro.

Cagots, a race of outcasts scattered among the population of S.W. France during the Middle Ages. Probably they were the descendants of the remnant of the Visigoths who escaped destruction by Clovis, or perhaps of the Saracens vanquished by Charles Martel at Tours; or they may have been a race with a hereditary taint of leprosy—a view supported by some recent inquirers. No doubt intermarriage developed hereditary weaknesses among them. They were only allowed to enter a church by a special door, to take holy water from a special receptacle, and were not even permitted to walk barefoot, for fear they should contaminate the streets. The testimony of seven Cagot witnesses was counterbalanced by that of one ordinary witness; they were not allowed to practise any trade save that of a carpenter or sawyer, and of course were prohibited from dwelling in towns. These disabilities lasted till the Revolution. Similar populations under different names were found in Brittany, Maine, Auvergne, and elsewhere, and traces are said still to exist in parts of the Pyrenees.

Cahan, a Brazilian nation, whose domain lies between the Miamaia, Escopil, and Igatimi rivers, in the province of Mato-Grosso. They are strictly a forest people, seeking the shelter of the thickets against their hereditary foes, the Gaicurus. Like the Pueblos Indians, they build large houses which accommodate many families; dress, a kind of cotton sack with head- and arm-holes; arms, the bow and poisoned arrow; ornament, a cylinder of transparent rosin inserted in a hole in the lower lip, answering to the wooden disk worn in the same way by the Botocudos. Despite their savage state the Cahans till the forest glades, where they grow cotton for the national dress, besides some corn and edible roots.

Cahete, a general name meaning *dense forest*, applied collectively to several Brazilian tribes of the province of Parahiba, who formerly lived in the remote woodlands to escape the attacks of the Indians occupying the open plains. Most of them have been exterminated by the Tupinambas of Para and Maranhão, and the survivors have now become *mansos, i.e.* civilised, occupying fixed settlements in the southern districts of Parahiba.

Cahitas, a large Mexican nation, states of Sonora and Sinaloa, along the east side of the Gulf of California between lat. 26° and 28° N., and inland nearly as far as the Tarahumaras. The Cahitas, who include the Yaquis, Tehuecos, and Mayos farther south, constitute one of Buschmann's four "Aztec-Sonora" groups, with speech betraying certain affinities to Aztec. The other three groups are the Cora, Tarahumara, and Tepehuana. The Cahitas are a mild, sociable people, very industrious, endowed with great intelligence, and courageous. Total population about 20,000, being much reduced by the emigration of the young men, who seek employment in large numbers in the towns and farmsteads of the neighbouring provinces.

Cahors, a French town, capital of the department of the Lot, and head of arrondissement, nearly 400 miles south of Paris and about 70 north of Toulouse. The town is on the south bank of the Lot, which makes almost an island of the hill on which Cahors is built. The industries of Cahors are of no great importance, but there is some trade in lime, walnut oil, truffles, wine and wool. The only monument of interest is the 11th or 12th century cathedral, the apse of which has not the same axis as the nave. At the university, no longer existing, founded by Pope John XXII., who was a native of the town, Cujas taught and Fénélon studied, and here were born the poet Claude Marot and Léon Gambetta.

Caiapo, a fierce Brazilian nation, at one time powerful in the provinces of Goyaz, São Paulo, and Minas Geraes. Many still survive in the woods and along the banks of the rivers, especially in Goyaz, but are much less ferocious than formerly. A few have even adopted civilised ways, though all attempts have hitherto failed to induce the bulk of the nation to lead settled lives. Even the young of both sexes captured and brought up in the neighbouring towns almost invariably take to the woods on the first opportunity. They go naked, dwelling in frail habitations of foliage, and armed with the bow and arrow and a massive club, used both in battle and the chase.

Caillaud, FREDERIC (1787–1869), a French traveller, born at Nantes. Having a taste for mineralogy, he came to Paris to study natural science, and acquiring also a taste for travelling he visited successively Holland, Italy, Sicily, Greece, and Turkey, collecting minerals and dealing in precious stones. In 1815 he was commissioned by Mehemet Ali to explore the desert east and west of the Nile, and discovered ancient emerald mines, ancient roads, temples, and other interesting antiquities. In 1819 he made another expedition, and being allowed in 1821 to accompany Ismael Bey, the son of Mehemet Ali, in a campaign against Nubia, he profited by it to make observations of the highest value in archæology, geography, and natural history. He afterwards became director of the museum of Nantes, and published interesting works both on his travels and discoveries, and on the life, manners, and conditions of the ancient races of Egypt, Nubia, and Ethiopia, accompanied by details of the manners and customs of the modern inhabitants of those countries.

Caillié, RENÉ (1799–1838), a French traveller, born at Mauzé, who, losing his parents very early, received no further instruction than some knowledge of reading and writing. Coming by chance upon a copy of *Robinson Crusoe*, he was so carried away by the yearnings for adventure that at 16 years old he set off for Rochefort with only £3 in his pocket and embarked for Senegal. He there

acclimatised himself, and learnt some of the native languages, and then without external aid, and in spite of the unwillingness of the French Governor of Senegal, and the English Governor of Sierra Leone, in 1824 he penetrated into Central Africa, passed through the country of the Foulahs and the Mandingoes, explored the banks of the Niger, and reached Timbuctoo in 1828, returning by way of the Sahara to Morocco. The Geographical Society of Paris awarded him a prize of £400, and Charles X. made him chevalier of the Legion of Honour. His notes and observations have been collected by M. Jomard and published in 1830 under the title *Journal d'un Voyage à Tombouctou et à Djenné dans l'Afrique Centrale.*

Cain, according to the Hebrew tradition, the eldest born of Adam and Eve, the first man, therefore, born upon the earth. He was a cultivator of the land, while his younger brother Abel was a feeder of flocks. In a fit of jealousy, because Abel's offerings were more acceptable in the sight of God than his own, Cain slew his brother, and when accused by God of the crime avowed his fault and went into exile. He appears, according to the tradition followed by Josephus, to have gone into a land inhabited by a different race than that sprung from Adam, and there to have married, and founded a city which he called after the name of his son Enoch. Later, he is said to have been killed while hunting by his nephew Lamech, though another tradition represents him as living till the Deluge. Mussulman tradition says that the cause of the dispute between Cain and Abel was jealousy, as they could not agree which of their sisters they should respectively marry. Victor Hugo has written some vigorous verses on the subject of Cain, and Byron's drama of *Cain* is among the finest of his works.

Cainozoic, from the Greek *kainos*, recent, and *zoe*, life, a term applied by John Phillips to the Tertiary series of rocks, or "strata above the Chalk" of earlier writers, as corresponding with Palæozoic (formerly Primary) and Mesozoic, or Secondary, and alluding to the fact that the fossils, especially the mollusks, in these rocks either belong to existing species, or have at least a modern facies. The prevalence of fruit-bearing plants (angiosperms) and of carnivorous gastropods (whelks, etc.), the appearance of hoofed mammals, followed by other orders, and the disappearance of the ammonites, belemnites, ichthyosaurs, plesiosaurs, dinosaurs, and pterosaurs, characteristic of the Mesozoic, are among the chief features of the life of the Cainozoic period.

Ça Ira (*it will go on*), the popular song of the French Revolution, first known to have been sung in 1790 by the 200,000 Parisians who prepared the Champ de Mars for the fête commemorative of the taking of the Bastille. (The phrase itself is attributed to Benjamin Franklin, who, tired of being questioned as to the progress of the American Revolution, regularly gave this answer.) The music of the song is said to be adapted from a dance tune then in vogue; the authorship of the words was claimed by a singer named Ladré.

Caird, EDWARD, was born in 1835. Educated at Glasgow, he went to Balliol as an exhibitioner, and in 1864 was elected fellow and appointed tutor at Merton. In 1866 he was appointed professor of moral philosophy at Glasgow University, and in 1893 Master of Balliol. He has published *A Critical Account of the Philosophy of Kant*, a little book upon Hegel, and an examination of *The Social Philosophy and Religion of Comte.*

Caird, JOHN, a Scottish preacher, born (1820) at Greenock. He studied at Glasgow University, and held cures successively at Newton-on-Ayr, Edinburgh, Errol, and Park church, Glasgow. A sermon preached at Crathie, on *The Religion of Common Life*, made much impression when published, and was highly esteemed by Dean Stanley. In 1858 Mr. Caird published a volume of sermons, and in 1880 an *Introduction to the Philosophy of Religion.* He became D.D. in 1860, professor of divinity in 1862, and in 1873 principal of Glasgow University. He died in 1898.

Cairiri, a numerous Brazilian people, who at the time of the discovery occupied the whole of the Borborema mountains. At present they are known as Cairiris Velhos ("Old Cairiris") or Cairiris Novos ("New Cairiris"), according to the locality and time when they first became known. The Velhos are found chiefly in the uplands, between the provinces of Parahiba and Pernambuco, where their chief settlement of Cairiri now bears the title of Villa do Pilar. They are generally of somewhat repulsive appearance, of a dirty yellow complexion, short, thick-set figures, black matted hair, and flat features. They live by the chase, and on wild berries, but some are now settled, growing maize and cotton.

Cairn, a word of Celtic origin, literally a crag, a rock, a pile of stones; but applied by anthropologists to any memorial or sepulchral heap of stones, identical with the barrow (q.v.) in all but the material. Frequent mention is made in the Hebrew Scriptures of "heaps of stones," and they seem generally to have been of the former kind. But when Joab slew Absalom, we read that they buried him in a "great pit in the wood, and cast a great heap of stones upon him" (2 Sam. xviii. 7). Johnson (*Tour in the Western Islands*) defined a cairn as a "heap of stones thrown upon the grave of one eminent for dignity of birth or splendour of achievements;" and no doubt this was generally the case. But possibly in the burial of Absalom under a cairn there may have been some note of hatred or contempt. When Ophelia received Christian burial, though with "maimed rites" (*Hamlet* v. 1), one of the priests declared that

> "For charitable prayers
> Shards, flints, and pebbles should be thrown on her."

This, however, is exceptional, though memorial cairns occasionally marked the scene of a murder (*Heart of Midlothian*, ch. xi. and note). But the sepulchral cairn is chiefly Celtic; numerous examples occur in Scotland, Ireland, and Wales, and they are far from uncommon in Cornwall. Cairns possessing chambers are generally assigned to the Stone Age; those having *cistvaens* (or cists, as the

word is often written) to the Bronze Age and still later times. [MEGALITHIC STRUCTURES.] The former are much the larger; one near Drogheda being more than 300 ft. in diameter, and 70 ft. high, with a passage 63 ft. long leading to a chamber with several recesses. This cairn, with two others close by, was plundered by the Norse pirates early in the 9th century. The Cornish cairns appear to belong to the latter class, for the Rev. S. Baring-Gould says that they cover "stone coffins or *cistvaens* that have been for the most part rifled by treasure-seekers. One has a somewhat pathetic interest, for, beside the large stone chest just outside the ring of upright stones that enclosed it is a child's cist, formed of four blocks of granite, 2 ft. 7 in. long, the covering stone removed, and the contents scattered to the winds." [STONE-CIRCLES.] Evans (*British Barrows*) says that the very natural mode of interring in cists of greater or less size, and of different shapes, has prevailed in almost all parts of the Old World, where suitable stone was to be procured, and that a similar method has been observed in the grave-mounds of America.

Cairnes, JOHN ELLIOT, political economist, was born in 1824 at Drogheda, Ireland. Educated at Trinity College, Dublin, he became Whately Professor in Dublin in 1856, Professor of Political Economy in Queen's College, Galway, in 1859, and in 1886 Professor of Political Economy in University College, London. His writings display originality and independence of thought, and are written in a vigorous style. The chief are, *Logical Method of Political Economy*, and *Some Leading Principles of Political Economy Newly Expounded*. He died in 1875, having resigned his position in University College in 1872 through ill-health.

Cairngorm (so called from the central peak of the Grampian Mountains, among which it is found), yellowish brown rock-crystal, coloured by a slight trace of iron oxide. Its colour varies from a light wine colour to smoky, or even black (called Morion). It is also found in Cornwall, Brazil, India, and elsewhere, and is akin to the "Rauchtopaz," or smoke topaz, of which enormous masses have been found in Switzerland. It is much used in Scottish jewellery.

Cairns, HUGH MACCALMONT, Earl, lawyer and politician, was born in 1819 in county Down, Ireland. After a distinguished career at Trinity College, Dublin, he was in 1844 called to the bar at the Middle Temple, and in 1852 was elected M.P. for Belfast. In 1868 he became Lord Chancellor in Disraeli's government, a position that he held again under the same premier in 1874–80. He was a fluent speaker and a keen debater, and outside of his purely professional and political duties took an interest in philanthropic movements. He died in 1885. By an Act bearing his name, passed in 1858, the Court of Chancery was empowered to give damages to the party injured on a prosecution without court for specific performance of an agreement. The Supreme Court of Judicature now exercises the jurisdiction.

Cairo. 1. The capital of Egypt, situated on the right bank of the Nile, about 12 miles from the apex of its delta. The city is built on the lower slopes of the rocky range of Jebel Mokattam, and is partly surrounded by a fortified wall. Through it run upwards of half-a-dozen spacious thoroughfares, from which ramify a labyrinth of narrow and crooked streets, in which the oriental nature of the city is still retained. It is divided into ten quarters, which communicate by means of gates, the various quarters being named from the class of their occupants. There are several extensive squares and upwards of 400 beautiful mosques, the finest being the mosque of Sultan Hassan. Near this, in the S.E. and most elevated part of the town, is the citadel, which contains a well 270 feet deep, and called Joseph's Well, a palace built by Mehemet Ali, and a mosque of oriental alabaster, founded by the same pasha. Outside the city is a burying ground with tombs said to be the tombs of the caliphs. Among the educational institutions is the old Mohammedan university, with over 11,000 students. The town is provided with gas, the telephone, and other modern appliances, and a good water supply, and being the terminus of several railways does a considerable trade. It has also numerous bazaars and markets. Its manufactures are confined almost to paper, rude pottery, and woodwork. It was occupied by the British in 1882, and since then has been the chief seat of British influence in Egypt. 2. A city of the United States, capital of Alexander county, Illinois, is situated at the confluence of the Mississippi and Ohio rivers. It is also an important railway centre, and is advantageously placed for trade and commerce. During the Civil war it was a depôt for supplies, and was otherwise important.

Caisson, in civil engineering, is a structure much employed in the foundation of the piers of bridges or quays in deep running water. It consists of a strongly built casing of woodwork or metal, forming an enclosure that may be floated to the proper position over the site of the pier, and sunk by careful admission of water through a sluice. When settled in position, the work of building up the foundations of the pier may be carried on within the caisson undisturbed by the flow of water. Excavation is usually effected inside by means of a hollow metal column with an open-bottomed chamber at its base, within which the men work under compressed air. The caissons of the Forth Bridge were 70 feet in diameter, and reached a depth of 89 feet below the water-level. Often the caisson is simply filled up with concrete, with or without a brickwork lining. In shipbuilding, a caisson is a sort of hollow pontoon, which can be sunk under a ship, pumped out, and re-floated with the ship on it. The term is also applied to a case containing explosives, and formerly a submarine or subterranean mine: and to a hulk-shaped vessel made to fit into, and to block up, the opening of a dock. The caisson having been pumped dry, is floated into position and then filled with water, whereupon it settles tightly into its bed, and constitutes a nearly water-tight door to the dock.

Caithness, the most northern county of Scotland, covers an area of about 700 square miles.

For the most part it is moorland and bare, except in the west and south, where it is mountainous. Along the coast it is indented with many bays, the chief promontories being Dunnet Head, Duncansby Head, and Moss Head. It is watered by numerous small streams, and has no lakes of any importance. Fishing is the principal industry pursued. Caithness flags are also extensively quarried and exported for paving purposes. The chief town and only parliamentary burgh in the county is Wick, the centre of the British herring industry. Pop. (1901), 33,870.

Caius, JOHN, physician, was born in 1510 at Norwich. After studying at Cambridge he qualified as a doctor, and became physician successively to Edward VI., Queen Mary, and Queen Elizabeth. In 1557 he obtained a licence to advance Gonville Hall, Cambridge, into a college, which still bears his name as the founder (Gonville and Caius College), and endowed it with considerable estates. Towards the end of his life he retired to his college, and resigning the mastership, he lived there as a fellow commoner. He wrote numerous works, erected a monument to Linacre in St. Paul's, and obtained in 1563, from the College of Physicians, a grant to take the bodies of two malefactors annually for dissecting purposes. He died in 1573, and was buried in CaiusCollege chapel.

Caivano, a town of South Italy, about eight miles north from Naples.

Cajabamba, a town of South America, capital of the Ecuador province of Chimborazo, stands on the plateau of Topi at an altitude of 9,480 feet above sea level. Formerly its site was occupied by Riobamba, a town that was destroyed by an earthquake in 1797.

Cajamarca, or CAXAMARCA, a department of Peru, situated between the Western Andes and the Amazon. Its area is about 14,200 square miles. The capital bears the same name, and was the scene of the murder of Atahualpa, the last of the Incas.

Cajeput Oil, a valuable stimulant and rubefacient oil of a green colour, obtained from the leaves of the Myrtaceous tree, *Melalouca Leucadendron*, var. *minor*, otherwise *M. Cajeputi*, by fermentation and distillation. It is prepared mainly in Celebes, Bouro, and Amboyna, and is consumed chiefly in India. From it is made the *Spiritus cajeputi* of the Pharmacopœia (dose 30 to 60 minims).

Cajetan, CARDINAL, was born in 1469 at Gaeta or Cajeta (whence he takes his name), Italy. His proper name was Thomas de Vio. Entering the Dominican Order while only 15 years old, he became General of his Order in 1508, Cardinal in 1517, and Bishop of Gaeta in 1519. He is chiefly known through having been sent as legate to Germany to endeavour to bring back Luther to his former faith. He wrote a *Commentary on the Bible* and on the *Summa* of Aquinas. He died in 1534 at Rome.

Calabar, a district on the West Coast of Africa, is not yet very clearly defined geographically. Since 1884 it has been under British protection. It is traversed by the rivers New and Old Calabar. The country is flat and the climate unhealthy. Its products embrace palm-oil, indiarubber, and shea butter. The chief towns, Duke Town and Creek Town, the Old Calabar, are British mission stations.

Calabar Bean (*Physostigma venenosum*), the Eséré of the natives, also known as the Ordeal bean of Old Calabar, is a strong woody twining plant, with trifoliolate leaves and pendulous racemes of purplish flowers, closely related to the scarlet-runner beans, but differing in having a hood over the stigma, whence its name. The dark-brown pods are 6 inches long, and contain two or three kidney-shaped, blackish-brown seeds, each about an inch long. These are extremely poisonous, and are used as a test for witchcraft, eating them producing either death or vomiting. The seed contains two active alkaloids, Physostigmine or eserine, and calabarine. Eserine is largely used in ophthalmic surgery. It is rapidly absorbed by the conjunctiva, and has a specific action on the muscular fibres of the iris, producing contraction of the pupil. It is thus a direct antagonist of atropine (q.v.). At the same time it reduces intraocular pressure, and hence its value in the treatment of glaucoma. Eserine is also employed to lower the excitability of the spinal cord in certain convulsive diseases.

Calabash, from the Spanish *calabazo*, a gourd, the common name of *Crescentia Cujete*, a tree largely grown in tropical America and the West Indies. Its globular fruits with a woody shell are used instead of pottery for basins, pipes, pails, spoons, and even kettles. The pulp is purgative, and the wood, though only obtainable in narrow planks, is light, tough, and pliant.

Calabria, the south-western extremity of the mainland of Italy, covering an area of upwards of 6,500 square miles. It comprises the provinces Cosenza, Catanzaro, and Reggio, and in the centre is traversed by the Apennines, at the foot of which are rich valleys, yielding agricultural produce and a variety of fruits. Its coast is flat and marshy, and important only for its tunny and anchovy fisheries. Silkworms are also extensively reared, and different minerals, such as alabaster, marble, gypsum, iron, tin, etc., are found. In ancient times the name Calabria was given to the south-eastern peninsula of Italy, the modern Calabria being then Bruttium.

Caladium, a genus of tropical aroids, with acrid properties, the corms and even the leaves of several species of which are, however, used for food when boiled. Several, having their arrow-shaped leaves variegated with white and red, are grown in hothouses in Britain.

Calais, a fortified town and seaport of France, in the department of Pas-de-Calais, is situated on the Strait of Dover, which is here 21 miles in width. It is surrounded with forts and other defensive works, which are strengthened by the nature of the surrounding country, susceptible of being flooded in the event of invasion. It is regularly built, the houses being mainly of brick and the streets spacious

and well paved. Among its notable structures are the Hôtel Dessin, now a museum, the church of Nôtre Dame, and the Hôtel de Ville. The importance of the town is chiefly derived from its being the chief landing-place for English travellers to the Continent. It has also extensive harbour accommodation, and does a large export trade. Among its industries are cotton and tulle manufactures. It was captured by Edward III. of England in 1374, and held by the English till 1558, being the last relic of the French territory under the sway of the Plantagenets.

Calamary. [SQUID.]

Calamine, zinc carbonate ($ZnCO_3$), one of the most important ores of zinc, occurs both in veins and in beds, associated with blende, smithsonite, galena, and other ores, at Vieu Montagne near Aix-la-Chapelle, in Cornwall, the Mendip Hills, near Matlock, at Alston Moor in Cumberland, Holywell in Flintshire, Leadhills in Lanarkshire, and elsewhere. It is a white or grey mineral, generally translucent and vitreous, occurring in earthy, incrusting, stalactitic and other massive forms, or crystallising in the rhombohedral system. It has a hardness of 5, but is brittle. Its specific gravity is 4 or a little more. It effervesces with hydrochloric acid, and is infusible by itself; but with sodium-carbonate on charcoal gives the characteristic white areola of zinc-oxide, which becomes green on being re-heated with cobalt-nitrate. It takes its name from *calamus*, a reed, from the form it assumes in smelting. Dana applies this name to zinc-silicate ($2ZnOSiO_2+H_2O$), which in England is commonly termed *Smithsonite*, a name which he applies to this carbonate. *Siliceous* or *electric calamine*, which is frequently associated with the former ore, is a silicate of zinc also known as Hemimorphite (q.v.).

Calamint (*Calamintha officinalis*) is a strongly aromatic perennial herb, belonging to the order Labiatæ and occurring commonly in a wild state on dry soil in England, Central and Southern Europe, North Africa, and West Asia. Its loose unilateral cymes of purplish flowers spring from the axils of the opposite ovate leaves. The calyx is tubular, with a straight tube and thirteen veins, its three upper sepals are well separated from the two lower; and the corolla has also a straight tube, an erect flat upper lip, and a spreading three-lobed lower one. The plant is used in making herb tea.

Calamites, a genus of fossil Equisetaceæ or horse-tails, found in the Carboniferous and Permian formations, generally merely as casts of the pith-cavity of a stem. Some species seem to have had a smooth surface and thick rind; others, to have had thinner rind and fluted internodes, as in the living *Equisetum*. They had solid nodes and apparently whorls of simple leaves; but their sporangia are not accurately known. The stems of Calamites may be prostrate or erect, and sometimes exceed 20 feet in height.

Calamus, a genus of palms, comprising over 80 species, mostly natives of Asia, though some occur in Australia and in Africa. They have slender reed-like but solid stems, seldom more than one or two inches in diameter, which grow to great lengths, clambering up among the branches of trees by means of the hooked prickles on the stalks of their pinnate leaves. The flowers are small, in branched, catkin-like spadices, and the fruits are covered with smooth downward-pointing imbricate scales. *C. Rotang*, *C. rudentum*, *C. verus*, *C. viminalis*, and probably other Indian and Malayan species are the source of the largely-imported rattan canes, used for the seats of chairs, and, in their native countries, for cables and a variety of other purposes. *C. montanus* is twisted into suspension bridges over rivers in Sikkim. *C. Scipionum* is the thicker Malacca cane, imported from Singapore for walking sticks, and *C. australis* is the Loya cane, from Australia.

Calamy, EDMUND, Presbyterian divine, was born in 1600 in London. After being domestic chaplain to Nicholas Felton, Bishop of Ely, he was chosen lecturer at Bury St. Edmunds in 1626, a position that he resigned on the reading of the *Book of Sports* being made compulsory. He thereafter, in 1639, was appointed to the perpetual curacy of St. Mary Aldermanbury, London. He was an ardent controversialist in the religious disputes of his time, and was one of the principal writers of the celebrated treatise against episcopacy, *Smectymnuus*. His leanings were towards the monarchy, and during the protectorate he openly avowed his attachment to the Royalist cause, for which, on the Restoration, he was offered a bishopric, which, however, on conscientious grounds he refused. He died in 1666, after being ejected from the church for nonconformity, 1662. DR. BENJAMIN CALAMY, one of his sons, became a prebendary of St. Paul's, and was distinguished as the author of *A Discourse about a Scrupulous Conscience*. EDMUND CALAMY, a grandson, was also a well-known figure in his day, and a prolific writer.

Calas, JEAN, was born in 1698, in Languedoc. He was a respectable tradesman in Toulouse, when one evening his eldest son was found dead. This son being a Roman Catholic, while Calas himself was a Protestant, a suspicion arose that the father had on that account murdered him. The father was in consequence tried and sentenced to torture and to be broken on the wheel. This barbarous sentence was carried out in 1762, and Calas's property confiscated. Public attention was drawn to the affair by Voltaire, who was the means of procuring a revision of the trial. This resulted in the parliament at Paris in 1765 declaring Calas and his family innocent. Louis XV. granted the sum of 30,000 livres to the injured family.

Calatayud, a Spanish town in the province of Saragossa, is situated on the Jalon. In the vicinity are mineral springs, stalactitic caverns, and the remains of *Bilbilis*, the birthplace of Martial. The meaning of the name of the town signifies in Arabic "Job's castle."

Calatrava la Viega, a ruined city of Spain, is situated on the Guadiana. The Order of the Knights of Calatrava was founded by Sancho III. in 1158, when it was besieged by the Moors.

Calaveras, a central county of California, covers an area of about 900 square miles. Among its chief attractions is a grove of mammoth trees. Its mineral deposits are also rich, comprising gold, copper, granite, quartz, limestone, and slate.

Calcarea, or CALCISPONGIÆ, are a group of sponges including those in which the skeletal structures are formed of carbonate of lime. There are two main divisions, the "Homocœla" and the "Heterocœla." In the former there is a large central digestive or gastric cavity, the whole of which is lined with the "collared cells" which are so characteristic of the sponges (q.v.); while in the latter these cells occur only as the lining of certain special cavities or "ampullæ." The Ascones are the most typical sponges of the former class, while *Homoderma* and its allies form a transition to the Heterocœla, as, in addition to the central gastric cavity, there are series of radial tubes. Among the Heterocœla the Sycones and Leucones are the most typical groups. They also include the *Teichoneæ*, in which the sponges are flat and leaf-like, and the small pores all open on the one side and the larger oscula all open on the other. The spicules of the calcareous sponges are very rarely found fossil.

Calcareous, a term applied to substances containing lime as a prominent constituent, *e.g.* calcareous rocks, as the different varieties of limestones. Calcareous waters are those in which a considerable quantity of carbonate or sulphate of lime is present.

Calcareous Springs occur mostly in limestone districts, especially along the outcrop of the junction of the limestone with underlying impermeable beds. The water, even if only slightly impregnated with the soluble calcium-bicarbonate (CaC_2O_6), on coming to the surface parts with some of its carbon-dioxide (CO_2), and consequently calcium-carbonate ($CaCO_3$), which is insoluble in pure water, is precipitated. This parting with carbon-dioxide may sometimes arise merely from evaporation; but it seems mostly due to the action of living green aquatic plants, such as *Chara*, mosses, and such flowering-plants as *Ranunculi* and *Potamogeton*, which take in and decompose this gas. The limestone is accordingly deposited upon the plants, and the springs, though in truth merely encrusting, are popularly called "petrifying." The precipitated limestone, known as calc-tuff, calc-sinter, or travertine (q.v.), may form a compact building-stone, and sometimes accumulates with great rapidity, as at San Filippo in Tuscany, where deposits three feet thick are formed in a year.

Calceola, a genus of corals from the Devonian rocks of Europe and America. Its position was not well known until recently, as owing to the possession of an operculum it was regarded as one of the Brachiopoda. Several genera of operculate corals, however, are now known. It is most common in the limestone of the Eifel in Germany, but is found in Devonshire.

Calceolaria, from a Latin word signifying a shoemaker, the name of a genus of *Scrophulariaceæ* which are favourites in gardens from their showy two-pouched flowers, bearing a faint resemblance to a shoe. They are herbaceous or shrubby, with simple leaves in pairs or threes, often viscid or hairy, two stamens, and a yellow, white, or purple corolla. The genus is wild in South America to the west of the Andes, occurring at an altitude of 11,000 feet near Quito, in the South, and in the Falkland Islands. Many beautiful hybrid forms have been raised in cultivation.

Calchaqui, a South American people widely dispersed over the northern provinces of the Argentine republic, but now much mixed with the Spanish populations. After sustaining an almost continual warfare for 120 years against the Spaniards, they were at last reduced in 1670, when large numbers were massacred. They occupied the extensive basin of the Rio Juramento, which from them is often called the Calchique Valley. The surrounding settlements of Cafayate, Tinogasta, Tolombon, and Fiambala are also named from now extinct Calchiqui tribes.

Calchas, in Greek mythology, a seer who foretold the length of the siege of Troy, and ordered the sacrifice of Iphigenia to stay the adverse winds that were detaining the Greek fleet at Aulis.

Calciferous Sandstone, the Scottish representative of the lower portion of the Lower Carboniferous rocks, being contemporaneous with the Tuedian and the lower portion of the Carboniferous Limestone of England. It is divided into two groups, the lower or Red Sandstone group, and the upper or Cement-stone group. The former passes downwards into Old Red Sandstone, and in Ayrshire contains Old Red Sandstone species of fish with intercalated limestone bands containing Carboniferous Limestone corals. It is succeeded by extensive sheets of volcanic rocks (porphyrites and tuffs), in places 1,500 feet thick, with plant-bearing shales, extending from Arran and Bute to the mouth of the Forth, and from the Campsie Fells to Berwick and Liddesdale. The Cement-stone group, in the basin of the Firth of Forth, contains excellent building sandstone, used in Edinburgh, cement-stone or clayey limestone, clay-ironstone, coal, and valuable bituminous shales. The Burdie-House limestone, made up of the minute "shells" of the ostracod crustacean *Leperditia Okeni*, var. *Scoto-Burdigalensis*, but containing abundant fish-remains, belongs to this series. It also contains many and varied masses of lava, chiefly basalt, felsite, and porphyrite, and several varieties of tuff.

Calcination originally signified the heating of a metal or compound in order to produce a metallic oxide. It is now employed to denote not only this process, but also any heating in suitable furnaces which effects the expulsion of some constituents of the substance heated. In the case of ores the calcination is generally for the purpose of expelling sulphur, water, or carbonic acid.

Calcite, from the Latin *calx*, lime, the chief mineral form of calcium carbonate ($CaCO_3$), which substance being dimorphous also crystallises in the

prismatic system, and is then known as aragonite (q.v.). Calcite occurs in several hundred distinct crystalline forms belonging to the rhombohedral or hexagonal system, of which the chief are the scalenohedron or *dog-tooth spar* and the obtuse rhombohedron, the primary form which can be obtained from all the others by cleavage. It also occurs in stalactites, stalagmites, and other massive forms. When pure it is transparent, colourless, and vitreous, with a specific gravity of 2·7, and a hardness which is 3 in the scale. This form is known, from the source of the finest crystals, as *Iceland spar;* or, from the exceptionally wide divergence of the ordinary and extraordinary rays of transmitted light, as *doubly-refracting spar*. It is used as a polariser in the Nicol's prism (q.v.). Calcite is frequently tinted red, yellow, brown, or grey from the presence of impurities, *Fontainebleau limestone* being a variety crystallising in rhombohedra, but opaque from the inclosure of 65 per cent. of sand. Almost all the forms yield a white streak. Before the blowpipe calcite is reduced to quick-lime (CaO), and glows intensely, the carbon-dioxide being driven off. Even with dilute acids, such as ordinary vinegar, it effervesces freely from the escape of the same gas. Limestones, many of which are made up of animal remains, are merely impure massive forms of calcite. When earthy they are known as *chalk* (q.v.); when in small rounded concentric granules, as *oolite* (q.v.); when capable of taking a polish, as *marble* (q.v.). Many of these latter forms are entirely made up of small crystals, and are then termed *saccharoid marble*. Limestones are largely burnt into quick-lime, and impure varieties that contain clay furnish what is termed "hydraulic cement" which sets under water, and are therefore known as *cement-stone*.

Calcium (Ca; atomic weight, 39·9), a metallic element, which, although its compounds are very numerous, abundant, and widely distributed, is only obtained by difficult chemical processes. When prepared it is a yellowish metal of specific gravity 1·58, very ductile, decomposing water rapidly, and readily tarnishing by exposure to air. It closely resembles barium and strontium (q.v.) in its properties. [ALKALINE EARTHS.] Many of its compounds are very important in the manufactures and arts. Its *oxide* CaO is *lime*, and is obtained by heating the *carbonate* $CaCO_3$, which forms the different varieties of limestone, chalk, and marble. Lime unites with water to form a *hydroxide* $Ca(OH)_2$, which is then known as "slaked lime." Bleaching powder (q.v.) is a compound of calcium with oxygen and chlorine. Its *fluoride* CaF_2 occurs native as Fluor spar (q.v.), and occurs associated with other elements in tourmaline and other minerals. The sulphate $CaSO_4$ forms the mineral *anhydrite* (q.v.), and united with water constitutes *selenite, gypsum,* and *alabaster* (q.v.). From these, by heating, "plaster of Paris" is obtained. Its *silicate*, $CaSiO_3$, is a prominent component of glass, and occurs native as *wollastonite*. The *phosphate*, $Ca_3P_2O_8$, is the principal mineral constituent of bone, and occurs also as the mineral *apatite*. The *sulphide*, CaS, from its power of shining in the dark, is known as Canton's phosphorus.

Calculating Machines are those designed to perform automatically certain mathematical processes such as addition, subtraction, multiplication, or division. The earliest known is that of Pascal, invented in 1642, and capable of performing addition and subtraction. Since that time many such machines have been designed, as a general rule cumbrous, complicated, and liable to derangement. Thomas's machine of 1850, modified in 1883 by Edmondson, gives very satisfactory results, performing multiplication and division of large numbers with great facility and accuracy by the mere turning of a handle. One turn of the handle when the instrument is arranged for the multiplication of a number, exposes that number to view, each digit on a small dial. A second turn exposes the number multiplied by 2, and so on for further turns. In fact, one turn is necessary for each unit in each digit of the multiplier: thus to multiply any number by 621, nine turns are necessary. For division, which process is simply the reverse of the additive process of multiplication, a turn of the handle is required for each unit in each digit of the quotient. It is equally easy to perform with decimals. The noise created by working the instrument is rather tiresome, but there is no doubt of its utility in many cases of tedious arithmetical calculation. Babbage's famous machine, the actual outcome of the theoretical design of which is now preserved in the South Kensington Museum, was intended to effect calculations of very great complexity, but failed. [SLIDE-RULE.]

Calculus. Concretions of solid matter sometimes develop within the body; some constituent part of a secretory or excretory fluid, whether from being present in undue quantity, or from some other cause, fails to be eliminated in the dissolved condition, and gradually accumulating in the solid form constitutes a calculus or stone. Thus the ducts of the salivary glands may be blocked by a salivary calculus, concretions may form in the gall bladder constituting biliary calculi or gall stones, and last, but by no means least, a urinary calculus may develop either in the kidney or in the bladder.

Urinary calculi may be composed of several different substances. The stone may be originally developed in the bladder, and in that case is usually composed of triple phosphate (ammonio-magnesian phosphate), layers of which substance are deposited as the result of alkaline fermentation in the urine. Or the stone may in the first place form in the kidney, and subsequently descend into the bladder; such calculi are usually made up of uric acid (or urates) or oxalate of lime. The two last-named substances are rendered insoluble by undue acidity of the urine, while triple phosphate is deposited, as already indicated, as a consequence of undue alkalinity. It is thus easy to understand how it comes about that a urinary calculus so often consists of superimposed layers of differing chemical composition. The nucleus of the stone consists, for example, of uric acid, formed in the kidney as the result of

undue acidity of urine; after a time the calculus passes down the ureter and reaches the bladder, there it sets up inflammation (cystitis), and, as a consequence of this, the bladder contents become alkaline. This changed reaction causes deposition of phosphates which accumulate, forming a layer external to the nucleus of the stone, and thus what is called an "alternating calculus" is produced. Urinary calculi may be formed in rare instances of other substances, *e.g.* cystin, xanthin, carbonate of lime. The causation of stone in the bladder is enveloped in considerable mystery. The deposit of layers of mixed phosphates, consequent upon the inflammation in cystitis, is, of course, well understood, but it is by no means so clear why the uric acid and oxalate of lime calculi are formed. Stone in the bladder is more common in men than in women, and more usually met with at the extremes of life than in people of middle age. It is certainly associated with locality; in parts of India, for example, calculus is of common occurrence. The symptoms are pain, increased frequency of micturition, and the passage of blood in the urine. The pain is especially felt, as a rule, at the end of micturition, when the wall of the bladder contracts upon the calculus; in some instances but little pain may be experienced, particularly if the calculus be large. The advent of cystitis brings with it a fresh group of symptoms, and the kidneys themselves may later become involved as the result of the bladder mischief. The presence of a calculus being suspected by the surgeon, he proceeds to explore the bladder by means of a sound. This instrument is a metal rod of suitable shape, which is passed down the urethra, so that one end projects into the bladder, while the other is held between the surgeon's fingers. Contact between the stone and the end of the sound, striking the stone as it is called, is the only indubitable evidence of vesical calculus. In the treatment of urinary calculus much has been thought and written on the subject of solvents. Practically, when a stone has once formed the only cure is its removal by surgical operation. Either the bladder is opened [LITHOTOMY], or the stone is crushed in the bladder, and the fragments washed out and so removed. [LITHOTRITY.]

Gall stones are usually composed of cholesterin or of bile pigment. They occur most commonly in women of middle age, but their mode of origin is ill understood. Gall stone colic is caused, as a rule, by the expulsion of the calculus from the gall bladder. The stone may reach the duodenum, and travelling down the intestinal canal, be removed from the body; or it may set up inflammation and give rise to serious trouble. Gall stones are sometimes removed from the gall bladder by surgical operation. [CHOLECYSTOTOMY.]

Calculus, DIFFERENTIAL and INTEGRAL, two of the higher branches of pure mathematics, with very far-reaching applications in all branches of exact physical science. Their introduction may be said to date from the time of Newton. They relate essentially to infinitely small quantities, and their ratios. Leibnitz came to certain of the facts of the differential calculus by the method of *infinitesimals*, *i.e.* by studying the small quantities themselves. Newton arrived at the same facts by the method of *fluxions*, *i.e.* by studying the limiting values of the ratios of these small quantities. To exemplify what is meant by infinitesimals and their ratios, we may consider a square with side of given length. The area of this square depends on the length of the side, that is to say it is a *function* of the side, and if the length be altered the area will alter to a definite extent. If the side is increased by a very small quantity, the area will only increase by a very small quantity; and an infinitesimal change in one corresponds to an infinitesimal change in the other. But the small increase in area is seen geometrically to be a rectangle of length, equal to twice the length of the side of the square, and of width equal to the small increment in the side. Hence the ratio of the increment of the area to the increment of the side must always be twice the length of the side when these increments are taken infinitely small. This ratio is known as the *differential coefficient* of the area of the square with regard to the side, and might be called the rate of change of area when the side is chosen as our independent variable quantity. So similarly we have the limiting ratio in the case of a cube with regard to its side always as three times the area of one face. For any function of any variable there is always a definite differential coefficient with regard to that variable, and this differential coefficient is known as the *first derived function*. It is in the province of the differential calculus to obtain such derived functions from the primitive, whereas the integral calculus supplies us with the primitive when the derived function is given. The latter is, therefore, the inverse process of the former, and requires the recognition of a derived function as corresponding to a certain primitive. To effect this recognition considerable change of form is sometimes at first necessary. Sometimes the integral cannot be solved on account of its form being entirely unlike any of the standard derived functions, and new realms in pure mathematics are opened up by the study of these new forms. [FUNCTION, VARIABLE.]

Calcutta, capital of British India, in the province of Bengal, is situated about 80 miles from the sea on the east bank of the river Hooghly, a branch of the Ganges, and navigable up to the city for large vessels. On the opposite side of the river is the town of Howrah, connection with which is maintained by a pontoon bridge. The river frontage is about 4½ miles, and the breadth of the town about 2 miles, the whole covering an area of nearly 8 square miles, hemmed in between the river and the circular road—a spacious way that marks its limits on the landward side. The southern part, or British quarter of the city, is occupied with well-built brick houses, in striking contrast to the northern or native portion, which is for the most part built of mud, bamboo, and such slight materials, with narrow and badly-laid streets. Between the fashionable quarter and the river is Fort William, the largest fortress in India, covering 2 square miles, and with accommodation for 15,000 men.

Other leading features are the Maidan Esplanade, called the Hyde Park of India, the Strand, an extensive quay running along the river bank for 2 miles, and the public edifices, among which may be noted the Government House, built 1799–1804 by the Marquis Wellesley at a cost of £1,000,000. The town is well supplied with filtered water from the Hooghly, excellently drained, lighted by gas, and traversed by trams. It is also abundantly supplied with educational institutions, among which, besides a university on the same pattern as the London University, are Bishop Wilson's, the Presidency, Mohammedan, and Sanscrit colleges, and other developments of civilisation. From its position, and as the terminus of several railways and canals, Calcutta is the largest trade emporium in Asia. Its chief import is cotton, and among its exports the leading are opium, jute, grains, tea, raw silk, and gunny bags. It has also various industries, carried on, however, chiefly by natives in their houses.

Caldecott, RANDOLPH, artist, was born in 1846 at Chester, and made a reputation, after removing to London, as a skilful worker in water-colours and a clever illustrator of humorous books. He made his first hit in 1875 by his illustration of selections from Washington Irving's works under the title of *Old Christmas*. In 1877 appeared *Bracebridge Hall*, and in 1878 the series of picture books on which his fame chiefly rests began with *John Gilpin* and *The House that Jack Built*. He also illustrated Mrs. Comyns Carr's *North Italian Folk*, Mr. Blackburn's *Breton Folk*, and Mrs. Ewing's *Daddy Darwin's Dovecote*. He was a frequent contributor to *Punch* and the *Graphic*. His health giving way, he sought to recover it by change, and died in 1886 in Florida.

Calder, SIR ROBERT, baronet, a distinguished British naval officer, was born on July 2nd, 1745, and, entering the navy, assisted, in 1762, in the capture of the rich register ship *Hermione* in the Mediterranean. He subsequently served in the West Indies as a lieutenant, and in 1780 was made a post captain. In 1794 he commanded the *Theseus*, 74, in Lord Howe's fleet, but was not fortunate enough, having been just previously dispatched with a convoy, to be present at the victory of the Glorious First of June. In 1796, in the *Victory*, 100, he became captain of the fleet to Sir John Jervis, and, as such, participated with honour in the battle off Cape St. Vincent on February 14th, 1797. For this service he was at once knighted, and in the following year he received a baronetcy. On February 14th, 1799, he was promoted to be rear-admiral, and in 1801, with part of the Channel fleet, was dispatched in pursuit of Rear-Admiral Gantheaume, who had escaped from Brest. He did not, however, succeed in catching him. In 1804 he became vice-admiral, and on July 22nd, 1805, being then again in command of a squadron in the Channel, with fifteen sail of the line under his orders, met a combined Franco-Spanish fleet of twenty sail of the line. In spite of his inferiority he gallantly attacked the enemy, and succeeded in capturing the *San Rafael*, 84, and the *Firme*, 74. Having been, nevertheless, blamed for not further pursuing his advantage, Sir Robert demanded a court-martial, which ultimately declared that he had not done his utmost to renew the engagement and to take or destroy every ship of the enemy. This neglect was attributed to an error in judgment, and the vice-admiral was, in consequence, severely reprimanded. Public opinion, when it had had time to cool, recognised that the conclusion was not just. Calder's victory was indeed a real victory, and, in the view of many, it was more important in its political and strategical than even in its material results. In the middle of 1810 this gallant officer became commander-in-chief at Portsmouth, and on July 31st of the same year he reached the rank of admiral. He died at his seat at Holt, near Bishop's Waltham, on September 1st, 1818.

Calderon, PHILIP HERMOGENES, painter, was born in 1833 at Poitiers. After studying in London and Paris he became a contributor to the Royal Academy in 1853, his first picture being *By Babylon's Waters*. He was elected R.A. in 1867, exhibiting in the same year at the Paris International Exhibition, where he won the first medal awarded to English art. In 1887 he was appointed keeper of the Royal Academy. His subjects were mostly historical. He died in 1898.

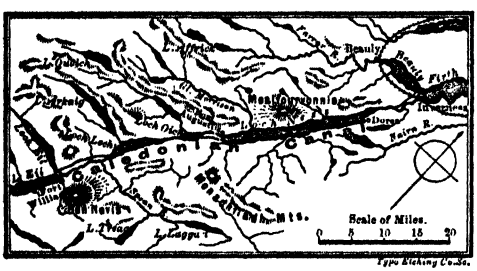
Calderon de la Barca, DON PEDRO, dramatist, was born in 1600 at Madrid. When only 14 years of age he had written his third play. In 1625, however, though he had received high commendation for his essays in poetry, he joined the army, serving with distinction in Milan and the Netherlands. In 1636 he was appointed master of the revels at the court of Philip IV., and in 1637 created a Knight of the Order of Santiago. After a further period of military service he, in 1651, entered the priesthood, becoming chaplain in 1653 in the archiepiscopal church of Toledo. In 1663 he was appointed chaplain of honour to the king, and enjoyed the emoluments of other offices. During all these years he continued to write poems and plays. Among the pieces he left are 95 *autos sacramentales*, outdoor plays for the festival of Corpus Christi; 200 *loas*, preludes; and 100 *saynetes*, farces. He died in 1681, and is now regarded as the greatest dramatist that Spain has produced.

Calderwood, DAVID, divine and ecclesiastical historian, was born in 1575, it is said, at Dalkeith. After studying at Edinburgh he became minister of Crailing, Roxburghshire, in 1604, and distinguished himself by his opposition to James VI.'s design of establishing episcopacy in Scotland. In 1617 he was imprisoned on a charge of contumacy and then banished. Withdrawing to Holland, he there published in 1623 his *Altar of Damascus*. In 1625 he returned to Scotland, and became in 1640 minister of Pencaitland, Haddingtonshire. He was one of the committee appointed in 1643 to draw up the *Directory for Public Worship in Scotland*. His chief work was the *History of the Kirk of Scotland*, which was published first in 1678 and then by the Woodrow Society in 1842–49. He died in 1650.

Caldwell, SIR BENJAMIN, a British naval officer, born about the year 1742, entered the navy in 1756, and became a lieutenant in 1760, a commander in 1762, and a post-captain in 1765. He served in 1781 under Admiral Kempenfelt, and in 1782 under Rodney in the West Indies. In command of the *Agamemnon* he took part in the actions of April 9th and 12th in that year. He was made rear-admiral in 1793, and was one of the flag officers present at Lord Howe's victory of the Glorious First of June, 1794. He afterwards commanded in the West Indies. In 1799 he attained the rank of admiral, and, having been made a G.C.B. in 1820, he died in the following year, being then nearly at the top of the flag-officers' list.

Caledonia, the name by which the territory north of the wall of Antoninus, which stretched between the Firths of Forth and Clyde, was known to the Romans; now used to designate Scotland in poetry.

Caledonian Canal stretches in a north-easterly direction across Scotland from the Irish



CALEDONIAN CANAL.

Sea to the North Sea. Its length is 60 miles, about 40 of which are occupied by natural lakes. It was begun in 1803 under Telford, and completed in 1823. It cost upwards of £1,300,000. Its locks number twenty-seven.

Calendar (Latin *Calendæ*, the first day of the Roman month), an orderly division of time into years, months, and other periods in accordance with the phenomena attending the revolutions of the heavenly bodies. At a very early period a solar year of 365 days was in use among the Egyptians. But among other nations the changes of the moon first suggested the idea of a regular division of time, and, when the year was introduced, it was made to consist of 12 months of 29 or 30 days. The discrepancy between this lunar year and the solar year soon became manifest, and attempts were made to remedy the defect by inserting at fixed intervals an additional or "intercalary" month. Thus the Jewish year consisted of 12 months of 30 and 29 days alternately; an additional month was introduced in 7 out of every 19 years, and over and above this one or two days were sometimes added. The Attic year also contained 12 months of 30 and 29 days alternately; it was consequently 11¼ days shorter than the solar year of 365 days 6 hours, and in 8 years the difference amounted to 90 days. This led to the introduction of a cycle of 8 years, three of which contained an intercalary month. But as the exact length of the solar year is 365 days 5 hours 48 minutes 49 seconds, this cycle contained about 1½ hour too much. The difference was adjusted by a new cycle of 19 years, attributed to Meton (432 B.C.). The earliest Roman year, the "Romulian," is said to have been divided into 10 months, containing in all 304 days. It was superseded during the period of the kings by a lunar year of 355 days. The intercalary system was adopted at Rome, but very inefficiently applied, till 45 B.C., when Julius Cæsar instituted the Julian calendar. Adherence to this system was enforced by the Romans throughout their empire; it passed from them to the Christian states of Europe, and, except for the reform introduced by Pope Gregory, has remained unchanged up to the present time. Cæsar assigned to each month the number of days which it still retains, and made allowance for the additional 6 hours by adding an intercalary day at the end of February in every fourth year (*bissextile* or *leap year*). But, as in the case of the Athenian cycle of 8 years, the year was estimated at about 11 mins. 11 secs. more actual length, and by 1582 had advanced 10 days beyond its original starting point, the vernal equinox falling on the 11th instead of the 21st of March. In that year, accordingly, Pope Gregory XIII. enacted that the days between the 4th and 15th of October should be omitted, and what would have been the 5th became the 15th of the month. To prevent a repetition of the error, he also enacted that the first year of a century should be reckoned as leap-year once only in the course of 400 years. Thus 1700 and 1800 were not leap years, but 2000 will be one. The new style was immediately adopted in Italy, Spain, Portugal, and the Roman Catholic portion of the Netherlands, and in the next two years in those parts of Germany and Switzerland which acknowledged the authority of the Pope. Religious prejudice retarded its acceptance by the Protestants of Germany, Switzerland, and the Netherlands till 1700. England retained the old method of computation until 1752, when, by an Act of Parliament passed in the preceding year, 11 days were omitted, the 3rd of September being reckoned as the 14th. The reform also made its way into Sweden about the middle of the eighteenth century. Russia and Greece still adhere to the old method, and the difference between their calendar and ours is now 12 days, *e.g.*, our 28th of May is with them the 9th of June.

The Mohammedans employ a lunar year of 354 days, but during a cycle of 30 years they eleven times add a day at the end of the year, so that the number of days is then increased to 355. It of course follows from this arrangement that the beginning of their year does not correspond with any fixed point in the course of the solar year.

During their first revolution the French adopted a new calendar, the use of which was decreed by the Convention in 1793. The year was divided into 12 months of 30 days each, which received their names from the most striking aspect of Nature at the time of their occurrence. The first, Vindémiaire, began on the 22nd of September, the last day of

Fructidor fell on the 16th of the same month; there was thus a surplus of 5 days, which were devoted to the observance of great national *fêtes*. This system was abolished by Napoleon on the 10th of Nivose, year of the Republic XIV. (December 31, 1805).

Calendering, a corruption of the word cylindering, is the process of finishing textile fabrics for sale, imparting to them a lustre and polish, which is technically termed "glaze." Before calico or cotton cloth can be printed (q.v.) it has to be calendered, an even surface being thus produced, the irregularities of the weaving and the rounded threads being flattened down. A calender has been compared to the domestic flat-iron, and the old-fashioned mangle, for its work is similar. The complicated geared machine, however, bears no resemblance to either. It consists of a series of cylinders, superimposed in a vertical iron frame, and with the pressure regulated by screws and levers. These cylinders, or rollers, have not only to furnish pressure, but friction, heat, and moisture as required. They are, therefore, arranged on different plans, and the materials of which they are made may either be metal, cotton, or compressed paper, which will not warp nor split under the alternating influences of heat and cold as wood will do. A "three-bowl" calender usually has its middle cylinder of metal. Such a machine is used for dressing gauzes, muslins, and lawns, which are passed between the cylinders cold. In another calender one of the rollers may be heated with steam, or gas, or a red-hot iron placed within it, the heat being necessary, for example, to put a finish or a glaze to paper. In silk *moirés* the water surface is obtained by the medium of the calender. To produce imitations of leather for bookbinding engraved bowls are employed in combination with paper cylinders, the one fitting accurately into the other. Calendering is also resorted to by jute and linen manufacturers, steam laundries, and the makers of indiarubber, to roll their material into sheets. The chief centres of the industry are in Manchester, Glasgow, and Dundee.

Calends, or KALENDS (from a word meaning to call), the first day of the Roman month on which the feast days and unlucky days, on which no business might be done, were publicly proclaimed. The dates in the latter part of the Roman month are reckoned backwards, counting inclusively from the calends of the next month: thus, September 20 is "the twelfth day before the calends of October." The "ides" (so-called because they divide the month) are on the 13th or 15th, according to the month, the "nones" on the 5th or 7th, *i.e.* nine days before the ides, counting inclusively. Dates between the calends and nones are counted backwards from the nones, between the nones and ides backwards from the ides. As the Greek calendar has no calends, "to pay at the Greek calends" (said by Suetonius to have been a favourite colloquial phrase of the Emperor Augustus) meant not to pay at all.

Calendula, a genus of the *Compositæ* belonging to the sub-order *Tubulifloræ*, and the type of the tribe *Calenduleæ*. It has a nearly flat common receptacle, two or three rows of lingulate female ray-florets, and male disk-florets. The genus includes annual and perennial forms, mostly natives of the Mediterranean region, with strong-smelling yellow or orange flowers, and is said to derive its name from the fact that some species is in flower on the first day or calends of every month. The inflorescences of *C. officinalis*, the common garden Marigold, are used in homœopathic and domestic medicine, and to adulterate saffron.

Calhoun, JOHN CALDWELL, statesman, was born in 1782 in Abbeville co., S. Carolina. After graduating at Yale College in 1804, he studied law and began to practise in 1807 in his own neighbourhood. Succeeding in his profession, he embarked upon politics, serving in the State Legislature during the period 1808–10, and entering Congress in 1811. He was Secretary for War in Monroe's cabinet 1817–25, Vice-President of the Republic 1825–31, senator in 1831 and 1845–60, and Secretary of State 1844–45. In 1828 he had been a candidate for the Presidency, and in 1831 had issued his *Doctrine of State Rights*, in which he maintained that the constitution was merely a treaty, and that any state had a right to withdraw from its conditions. He believed in slavery, regarding it as an institution that conferred blessings on all concerned with it. His chief work is a *Treatise on the Nature of Government*. He died in 1850 at Washington.

Cali, a town of Colombia, South America, is situated on the western slopes of the Andes near the river Cauca.

Calibration of an instrument means the determination of the meaning of its readings. A galvanometer needle may be deflected 30° by an electrical current passing through the instrument; its calibration enables us to specify what is the measure of this current. If the measure is expressed absolutely, in ampères or other definite units, the calibration is called *absolute*. If only the comparison of the magnitudes of the currents that will produce definite effects is afforded, the calibration is termed *relative*. It is of considerable importance in most physical measuring instruments.

Calibre. The diameter of the bore of a small-arm or heavy gun. The calibres of the chief modern British firearms are as follows:—*Magazine rifle:* ·303 inch. *Guns:* 111-ton, 16·25 inch; 67-ton, 13·5 inch; 45-ton, 12 inch; 29-ton, 10 inch; 22-ton, 9·2 inch; 14-ton, 8 inch; 5-ton, 6 inch; 40-cwt., 5 inch; 26-cwt., 4 inch; 20-pounder (12 cwt.), 3·4 inch; 12-pr. (7 cwt.), 3·0 inch; 9-pr. (6 cwt.), 3·0 inch; 7-pr. (3½ cwt.), 2·5 inch. *Quick-firing guns:* 100-pr., 6 inch; 45-pr., 4·7 inch; 9-pr., 2·6 inch; 6-pr., 2·24 inch; 3-pr., 1·85 inch; and 1-pr., 1·46 inch.

Calice, or CALYX, is a term used to denote certain cup-like portions of animals and plants. Thus, among Corals (q.v.) the term is applied to the upper part of the skeleton of a single individual; among Crinoids the Calyx is the crown *minus* the arms. The Calyx usually contains the chief viscera.

Calico Printing is the art of applying chemicals and colours to the surfaces of textile fabrics in such a way that patterns of a permanent character are produced. As practised in Europe, the industry requires the exercise of the highest degree of chemical knowledge and mechanical skill, and it differs very widely from the primitive methods which have been adopted in the East for centuries, and which are there still in operation. In Persia and in India the manufacture of chintz for the European market was carried on largely until 1721, when a law was passed in this country to protect home weavers by prohibiting the wear of all printed calicoes whatsoever. This measure followed the imposition of a very heavy duty in 1700. Calico, or cotton cloth, took its name from Calicut, in Malabar, and here the art was in full activity. Its principal secrets, as the mummy coverings prove, were, however, known to the Egyptians in the days of the Pharaohs. In India, carved hand blocks, one for each tint, are to this day employed by the handicraftsman to imprint the patterns, but the chief merit of Indian tissue stuffs has always been in the brilliancy of their natural dyes and not in the fineness of the printing. India has lost its great export trade of cotton manufactures, the competition of Manchester having been too severe, and Lancashire and Glasgow remain the centres of calico-printing in England, in both districts the art being first introduced in the early part of the 18th century. In Manchester it was established in 1763–5, but nearly a hundred years earlier (1676), when cotton printing had been imported from India to Holland, and thence to other parts of Europe, a Frenchman set up the first print works close to London.

Grey calico, or cotton cloth, has in this country to be prepared for ornamentation by singeing and bleaching. In block-printing the pattern is engraved upon sycamore wood, and by means of a "toby" it is possible, with one block, to imprint several colours at a single operation. The bulk of calico-printing in this country is done by machines. For the wooden blocks, engraved copper rollers or cylinders, 3 feet 6 inches long and 6 inches in diameter, are substituted. As each separate colour or shade in the pattern calls for its own cylinder, the stock of them which has to be kept by the manufacturers entails an immense expenditure. One machine may carry as many as twenty cylinders, but the number generally is about eight. These cylinders, together producing the design, do not print, except in some processes, in the sense that paper is printed with ink by stereotype. Their purpose generally is to convey to the cotton cloth, exactly where it is required, a chemical agent called a mordant, which, if it were not for the admixture of a little "sightening" colour, would almost be invisible. The mordant is an agent for fixing the dye which will hereafter be applied to the fabric. Red liquor (acetate of alumina) is one mordant, and black liquor (oxides of iron) another, and there may be a mixture of the two. Copper, lead, and tin furnish other mordants. Usually each mordant is printed on the cloth before the addition of the dye, but sometimes they are put on together. The mordants require to be thickened with white flour, potato starch, and other substances by which they are rendered soluble and converted into a dextrin similar to gum arabic in its properties. This preparation is to facilitate printing. Varying depths of shade are obtained by regulating the quantity of the mordant, and with one dye solution, and with different mordants, or mordants of different strengths, the full pattern of, say, ten colours, so far as the printing goes, may be completed at one operation in the machine, each colour or shade having its own cylinder and mordant box.

A calico-printing machine consists of a large cushioned central drum, or bowl, and against this the engraved copper cylinders are pressed, an endless blanket passing between the bowl and all the cylinders. Each cylinder is maintained in position by means of radiating mandrils, which also support a colour-box, in which revolves a wood cloth-covered roller, which takes up the mordant and distributes it upon the surface of the engraved copper cylinder, with which it is constantly in contact. The calico, in tension, guided by the blanket, and travelling with a "back cloth," receives the impression of all the cylinders in turn, as it passes between them and the central drum. Attached to each cylinder are two sharp blades of steel, one called the colour "doctor," its work being to shave off the excess of colour, or mordant, which is left on the engraved parts only; and the other, termed the "lint doctor," which keeps the cylinder free of all impurities which may come from the cotton cloth. Obviously the cylinders have to be adjusted most perfectly to secure a satisfactory result in placing the colours in their proper position.

The foregoing process of mordant printing is adopted in the "madder style," and the design then appears upon the cloth in feeble greys, giving little promise of its future richness of colour. In order to fix the mordant thoroughly in the fibre, the cotton pieces, after leaving the printing machine, are dried by being passed over revolving cylinders in a closed chamber into which a current of heated air is injected. They are "aged" in a confined but large chamber filled with moist and warm air, whereby in about twenty minutes, by means of a system of rollers between which the cloth is "threaded," is accomplished the work which in the old days took four days' hanging in the air to perform. In the "ageing" the acetic acid in the mordant is in great part disengaged in fumes, whilst a sub-salt is fixed in the fibre. The calico is now slowly passed through a weak bath of alkaline silicate or arseniate of soda, mixed with a little chlorate of potash, at a given temperature, with the object of completing the decomposition of the mordants and of separating those portions which are not thoroughly combined with the cotton, so as to prevent all danger of their blotting unmordanted parts. The materials used to thicken the mordants are also dissolved and removed. Cow dung, exclusively, was used formerly instead of the chemicals, and hence this process is still called "dunging."

The mordanted pieces are now ready for the dye "beck" or cistern, and the winch apparatus used imparts a circulating movement to the pieces,

which are prevented from becoming entangled, and are made to take the dye equally during the hour and a half or two hours they remain passing in and out of the liquor. The dye-liquor is heated by steam. After they are removed from the beck the pieces are well washed and boiled in order to "clear" the colours. Before this is done the mordanted parts which have taken up the colour are dull-looking, whilst the portions which should be white are pinkish. Soaping removes the excess of colour, and brightens the tints. The pieces are made continually to revolve in becks in one temperature, and are washed out, squeezed, and rewashed. It will now be seen how madder, or its derivatives, is affected differently by different mordants. Madder was at one time the most important of all dye-stuffs known to calico printers. It was used by the Egyptians in combination with alumina and iron mordants. In brilliancy and variety of shade and colour it stood unequalled, one dyeing operation sufficing to produce pinks, reds, purples, violets, puce, and black, all permanent under the action of light and of soap. Alizarine is its chief colouring principle, and since 1869, when a method of artificially preparing it from anthracene was discovered, it has been substituted largely for the dye from the madder root. In the printing from alizarine, and from garancin, another preparation of madder, the process is the same. The colours given by alizarine are, however, not so "fast" as those yielded by madder. Fast is a term applied to those colours which resist the action of light, air, water, alkali, dilute acids, and soap solution. With the same solution of alizarine the alumina mordant gives red, the iron mordant purple, and a combination of the two chocolate.

As the opposite of the madder style there is the "padding" style, in which the whole of the surface of the cloth is mordanted, the pieces passing through a trough and between rollers. They are then dried and the design is sometimes obtained by "discharging" the colour wherever required by printing with citric acid or salt of potash, which has the effect, when the material has gone through all the intermediate stages and has reached the dye-beck, of preventing the colouring matter from adhering to the parts protected by the acid, and which thereupon show up white on a coloured ground. The white parts may receive other colours afterwards.

Indigo, which is a very valuable dye, requires to be treated in a particular manner owing to its being insoluble in water. It can, however, be made soluble if put in water with green copperas and slaked lime, a process of deoxidation which changes the blue indigo into soluble white indigo. White indigo takes up oxygen with great facility, and thus regains its blue. The plan, therefore, is to dip the calico hooked on to a wooden frame into vats holding the soluble or white indigo, and then expose it to the air in order to recover the temporarily lost colour. The pieces are dipped again and again for darker shades; and they are passed through "sours," or a solution of sulphuric acid, permanently to fix the indigo. Amongst other oxidation colours are, besides indigo, catechu, aniline black, and some of the logwood blacks, which do not require a mordant but need to be developed and fixed by exposure to the air or by some oxidising agent. When a white device, or "figure," on a blue ground is desired the pattern is printed with a "resist" paste, which is removed after dyeing, the resist being frequently made of sulphate of zinc or nitrate of copper and soap, thickened with gum. It prevents the indigo or other colour from attaching itself to the parts it covers, and which may, if not left white, be treated with other colours subsequently.

Topical colours are those which are printed upon the top of the cloth, and are fixed by the action of steam. These insoluble pigments, such as vermilion, cadmium, chrome yellow, ochre, umber, and the non-poisonous and less expensive painters' colours, in the form of a fine powder, are mixed with albumen and then printed. The steam to which the pieces are afterwards exposed coagulates the albumen and fixes the pigments mechanically. Ordinary steam colours are those which are fixed by chemical agency. When steam colours are used the work in many stages is much lighter than that attaching to the madder style. Aniline colours form a very important branch of the steam department. In the steam style the colour-boxes on the printing machine contain not mordants merely but all the materials necessary to the production and fixing of a distinct colour or shade, so that one advantage is the direct printing at one operation, without a dyeing process to follow, and another advantage is the fixing of the colours in a great variety by the agency of steam alone. Before the printed calico is ready for the market a number of finishing processes are necessary, in order to impart a glossy and better appearance to the article.

Calicut, a seaport of India in the presidency of Madras, is situated on the Malabar coast. It was formerly a Portuguese colony, but since 1792 has been in English hands. It gives its name to calico, and has considerable cotton manufactures. It was also the first port in India visited by Europeans—by Covilham in 1486 and by Vasco da Gama in 1498.

Calif, CALIPH, or KHALIF, is the title borne by the successors of Mohammed in temporal and religious affairs.

California, one of the United States of America, is situated on the Pacific coast. Its boundaries are: N. Oregon, E. Nevada and Arizona, S. Mexico (Lower California), and W. the Pacific. It covers an area of about 160,000 square miles, being thus one of the largest of the states. Its surface is singularly varied. Along the eastern border extends the Sierra Nevada, while along the coast extends the coast range. Between these mountain ranges is the Sacramento and San Joaquin valley. On the western slope of the Sierra Nevada is the celebrated Yosemite valley, and others of almost equally wonderful scenery, and on the eastern slope are rich mineral deposits. The coast-line is high and rocky, and is nowhere deeply indented except by the Humboldt, San Diego, and San Francisco bays. These provide California with its best harbours. The chief rivers

are the Sacramento and San Joaquin, the former with a course of 300, and the latter of 250 miles. It is, however, on account of its mineral products that California is chiefly interesting. These embrace rich deposits of gold, which was first discovered here in 1848, and led to an immediate inrush of settlers; quicksilver, lead, silver, borax, rock-salt, marble, asphalt, copper, tin,

MAP OF CALIFORNIA.

antimony, cobalt, and coal. Natural gas is also found, and petroleum in large quantities. This state is equally rich in the produce of its soil. Agricultural produce of every kind is grown on a large scale, and the various fruits of the temperate zone flourish, as well as the orange, lemon, fig, olive, almond, etc. The cultivation of the vine is rapidly extending, and Californian wine is exported. Bee-keeping and wool-growing are also important industries. In the N. of the state are extensive forests of "big trees" (*Sequoia gigantea*), some of which tower as high as 400 feet. Its exports of timber, tinned meats and fruits, and many other commodities, are important. The capital is Sacramento: the most important town is San Francisco, the largest city on the western side of America. Other chief towns are Oakland, Stockton, San José, Los Angeles, Marysville, Santa Cruz, and San Diego. The university is at Berkeley, which is practically a suburb of San Francisco, and the Lick observatory, famed for having the largest telescope in the world, is at Mount Hamilton, 50 miles S. of San Francisco. Until 1847 California was Mexican territory, when it was ceded to the United States, and in 1850 admitted to the Union. The state senate comprises forty, and the assembly eighty members, and it is represented in Congress by two Senators and eight Representatives. There are upwards of fifty counties in the state. **Lower California**, a peninsula on the Pacific coast of America, is Mexican territory, and is separated from the mainland by the Gulf of California, covering an area of over 60,000 square miles. Its surface is mountainous and somewhat dry. It is reputed to possess mineral resources not yet developed, its chief industries being the whale and pearl fisheries. The capital is La Paz, situated on an inlet of the gulf.

California, Gulf of, an inlet of the Pacific Ocean, on the W. coast of America, divides the peninsula of Lower California from the mainland. Its length is 700 miles, its width from 40 to 60 miles.

Californians. The aborigines of California form a distinct group of North American Indians, who, despite their favourable environment, occupy an extremely low position in the social scale. Continually encroached upon by the irresistible wave of white immigration, especially since the rush to the gold mines, they have been everywhere driven from the plains to the more inaccessible uplands, and even here they do not number more than 7,000. With very few exceptions they are an indolent, degraded race, broken up into innumerable tribes, or rather family groups, with no sense of national spirit, such as has been so highly developed amongst the Dacotahs and other prairie Indians. They speak a multiplicity of idioms, whose mutual relations are very difficult to establish, but which possess great philological interest, as showing the various stages of polysynthesis in actual development. These languages have been classed in three distinct groups, with several subdivisions, as under:—1. *Klamath* (Lutuami, Yacons, Modocs, Shastas, Eurocs, Cahrocs and many others), occupying the whole of the Klamath Valley, and extending eastwards into Nevada; with subbranches Pomos ("People"), the collective name of several tribes in the Potter Valley; the Ochecumne, and twenty-five other tribes whose names mostly end in *umne*, in the Sacramento Valley; and Napa, who give their name to the Napa Valley, North California. 2. *Runsiens*, including Olhones, Eslenes, Mipacmacs, Yolos, Talluches, and many other coast tribes from San Francisco to and beyond Cape Conception, and inland to Lake Tulare. 3. *Cochimi*, *Guaicuri*, and *Pericui*, of Lower California, mostly extinct. Besides these, the Shoshone (Snake) family of Oregon, Idaho, etc., is represented in California by several tribes, such as the Dieguenos (Kizh, Netela, Kechi), about S. Diego, the Cahuillos and Chemehuevi in the south-east corner; and the Athabascan family by the Hoopahs of Hoopah Valley, including the Haynaggi, Tolewah, Siah, and Tahahteen. Such was, roughly speaking, the original distribution of the Californian aborigines before the irruption of the white settlers. Near Benton, in South California, Lieutenant Wheeler found (1875) some rock scratchings, which seemed to bear some resemblance to archaic Chinese hieroglyphics. On this and other equally fanciful grounds attempts have been made to connect the natives of California with the Chinese, Japanese, Malays, and other Eastern peoples. Such theories, though very popular, are baseless, and the Californians must be regarded as aborigines, in the same sense that all the other primitive inhabitants of the New World are aborigines. The most comprehensive account of the Californian peoples will be found in H. H. Bancroft's *Native Races of the Pacific States*, 5 vols., 1875–76.

Caligula, CAIUS CÆSAR AUGUSTUS GERMANICUS, Roman emperor, was born in the year 12 A.D. at Antium, and was the youngest son of Germanicus and Agrippina. He was brought up partly among the soldiers commanded by his father on the Rhine, and nicknamed Caligula from the soldiers' boots, *caligæ*, he wore. Succeeding Tiberius in 37, he at first became popular by his generosity and the mildness of his rule. Soon, however, after an illness brought on by excesses, he became a monster of cruelty and lust. He carried on incestuous intercourse with his sister Drusilla, and while dining would have victims tortured and slain in his presence. He made love to the Moon, believed himself to be Jove's brother, and gave other distinct tokens of insanity. So unbearable did his cruelties become that a band of conspirators assassinated him in 41.

Caliph (Arabic, *successor*), the title assumed by those who succeeded Mohammed as spiritual and temporal leaders of the Saracens. The first two Caliphs, Abu Bekr (632), and Omar (634), were fathers-in-law; the second, Othman (644), and the third, Ali (655), sons-in-law of the prophet. Ali was engaged in a constant struggle with Moawia, governor of Syria, who supplanted his son Hasan, and founded the dynasty of the Omiades (661). He removed the seat of government to Damascus. Between the death of Mohammed and the fall of the Omiades in 750, the Saracens established an empire, extending from the Atlantic to the Indus and the deserts of Tartary. In accordance with the prophet's teaching, the Caliphs allowed the inhabitants of the countries they subdued to choose between the *Koran*, *tribute*, and *the sword;* those who accepted the teachings of Mohammed enjoyed the same privileges as the natives of Arabia; permission to profess another creed could be purchased by the payment of tribute; those who refused these alternatives had to fight in defence of their national liberty. In their fanaticism the Arabs did not wait till they had consolidated their dominion over one country before passing on to the conquest of another. Syria and Persia were attacked simultaneously in 633. The forces of the Emperor Heraclius were defeated by Kalid near the river Yermuk (634); Damascus surrendered in the following year; and after the submission of Jerusalem (636), Palestine as well as Syria owned the sovereignty of the Caliph. The presence of Omar at the siege of Jerusalem is worthy of remark, as the Caliphs seldom took an active part in their foreign conquests. Between 633 and 651 the Arabs overran the whole of the vast Persian dominions; Yezdigerd, the last of the Sassanides, was driven beyond the Oxus, and finally slain by his faithless Turkish allies. The town of Cufa was selected by the Caliphs as the centre of their dominion in the East. Their territory in this quarter was afterwards extended by the conquest of Transoxiana under the Omiad Caliph Walid I., in 705. The subjugation of Egypt, undertaken by Omar in 638, was rendered easier through the aid of the Christian sect of the Copts, who were jealous of their Melchite adversaries, and eager to throw off the yoke of the Eastern emperors. After taking the ancient city of Memphis, Omar's lieutenant, Amr, marched against Alexandria, which, owing to its strong position between the Mediterranean and the lake Mareotis, was able to maintain a stubborn resistance, and was more than once retaken by the Byzantine fleets. In 647 Othmar sent an army across the Libyan desert which advanced almost as far as Carthage, but no further attempts were made in this direction till the reign of Moawia, when Okba penetrated to the Atlantic, and founded the city of Kairwan (south of the modern Tunis), as a centre from which further conquests might be carried on. The internal dissensions of the Caliphate retarded the progress of the Saracen arms in Africa; some of their conquests were lost, and it was not till 698 that Carthage fell into their hands, after a severe conflict with the forces of the Eastern empire. Even after this date the country was overrun by the Berbers, but by 709 the Saracen dominion had been firmly established along the southern border of the Mediterranean. Meanwhile, Constantinople had been unsuccessfully attacked during the reign of Moawia (673); the attempt was repeated by Soliman and Omar II. (716–18), but the Saracen fleet was almost annihilated by the Emperor Leo the Isaurian. In 710 a favourable opportunity for attacking the Gothic kingdom of Spain was afforded by the treachery of Count Julian, governor of Ceuta, who was engaged in a conspiracy with the sons of Witiza, a preceding king, against his successor, Roderic. The conquest occupied three years, at the end of which the Goths had been driven into the north-western corner of the Peninsula. The treatment to which the conquerors Musa and Tarik were subjected by Soliman on their return to Damascus affords a striking example of the policy pursued by the Caliphs towards their too successful lieutenants. The conquest of Spain was followed during the reign of Hisham by that of Septimania or Languedoc, but the threatened overthrow of the Frankish monarchy was averted by the victory of Charles Martel at Tours in 732, and in 755 the Saracens were finally driven out of Spain by his son Pepin.

In the middle of the eighth century the Arabs had reached the zenith of their glory as a great conquering power. The succeeding period is one of much external magnificence, beneath which lurked the elements of corruption and decay. It opens with a division of the empire into two entirely separate and independent states. The contests of rival candidates for the caliphate had hitherto been decided after a short and sharp struggle, but so vast an increase of territory rendered it impossible for a single ruler to maintain his authority over a people divided into innumerable sects, each of which could put forward its own claimant to the seat of Mohammed. In 750 Merwan II., the last of the Omiades, was defeated on the banks of the Zab by Abul Abbas, who represented the descendants of Abbas, Mohammed's uncle. He attempted to exterminate the rival family, but Abder Rahman, grandson of Hisham, escaped to Africa, and after obtaining succour from the Berbers, founded in 755 the Omiad

dynasty of Spain. About 762 Bagdad, built by Mansur, son of Abul Abbas, became the capital of the eastern caliphate. Amid the splendours of this city his successors gave themselves up to a life of luxurious refinement, and the period of the early Abbassides is the most glorious in the annals of Arabic art, philosophy, and literature. The lust of conquest withstood for some time the enervating influence of an effeminate civilisation. Harun al Rashid (786–809), Mamun (813–33), and Motasim (833-42), carried war and devastation through the provinces of Asia Minor, and threatened Constantinople. But Mamun drained the life blood of Mohammedanism by supporting the Persian sceptics who disputed the inspiration of the Koran. The Arabs were further outraged by the appointment of Persians to the command of armies, and high offices of state. The same line of policy was pursued by his successors, and it proved fatal to the integrity of the empire. Motasim instituted a bodyguard of 70,000 Turks, who under Wathek (842–7) and his successors obtained the complete control of affairs, setting up and pulling down Caliphs at their will. During the remaining four centuries of its existence the eastern Caliphate was a scene of ever increasing anarchy and confusion. It would be impossible to enumerate all the sects and dynasties which at various times exercised a greater or less degree of sovereignty in regions nominally subject to the Caliph. The only method by which the ruler at Bagdad could hope to curb these dangerous adversaries was that of inviting the assistance of some powerful tribe on their borders, who made use of the opportunity to carve for themselves an empire out of his dominions. The Soffarides, who had made themselves independent in Korassan, were in 898 vanquished by Ismail Samana, king of Bokhara, who had invaded their territory at the request of the Caliph Motaded. The Samanades soon showed themselves as troublesome neighbours as the Soffarides had been. In order to conciliate the Turks, Radi (934–40) created the office of Emir-al-Omra, and into the hands of this minister he resigned all his temporal power. Even this step did not save him from ruin, for in 945 Bagdad was taken by the Buvides or Dilemites, who came from the neighbourhood of the Caspian. Both the Caliph and his vizier now lost all political influence, though the former was still regarded as the spiritual head of Islam. During the eleventh century the Gaznivedes spread themselves from Afghanistan over Persia and a portion of northern India. They were overthrown by the Seljuk Turks, who had in 1055 expelled the Buvides from Bagdad.

After the division of the empire in the eighth century the eastern Caliphs lost all influence in the Mohammedan countries bordering on the Mediterranean. In 823 Crete was conquered by a band of Andalusian pirates, who kept possession of the island till it was retaken by the Emperor Nikephoros Phokas. During the ninth century the Aglabite dynasty, who had established themselves at Kairwan, overran a great part of Italy, attacked Rome (846), which was saved by the energy of Pope Leo IV., and in 878 completed their conquest of Sicily by the capture of Syracuse. This line of Caliphs was in 909 overthrown by Obeidalla, the representative of a dynasty which claimed to be descended from Ali and Mohammed's daughter, Fatima. The Fatimites or Shias fixed their residence at Mahadi, near Kairwan; in 970 they gained possession of Egypt, where they founded Cairo and continued to rule till they were overthrown by Saladin in 1171. Meanwhile the vigour of the Macedonian Emperors Nikephoros Phokas (963–73) and John Tzimiskes (973–6) had enabled them to recover the Byzantine dominions in Asia, which had become split up into a number of small Saracen states. But they never won back Syria, which was held by Fatimite Caliphs till the Turks conquered it during the latter part of the eleventh century.

The court of Cordova, the capital of the western Caliphate, rivalled in magnificence that of Bagdad, especially during the reign of Abd-er-Rahman the Third (912–61). The Omiades came to an end in 1031, but the title of Caliph was retained by their successors, the rulers of the Moorish dynasties of the Almoravides and the Almohades.

The Abbassides continued to reside at Bagdad till 1258, when the city was sacked by Hulaku, the grandson of Jenghis Khan. They then sought refuge in Egypt, where, under the protection of the Mamelukes, they retained their spiritual authority till 1577. Their title then passed to the Sultan of Constantinople.

Calisthenics, or CALLISTHENICS (from Greek words meaning *beauty* and *strength*) a sort of gymnastic exercises, usually performed by school-girls in a class, often with poles and rings, and involving rhythmic muscular motion.

Calixtus, the name of three Popes. CALIXTUS I. was Bishop of Rome from 217 to 224, when he was martyred. He is said to have been originally a slave. CALIXTUS II., previously Guido, Archbishop of Vienne, was elected pope in 1119, succeeding Gelasius II., who had been expelled. CALIXTUS III. was chosen in 1168 as anti-pope to Paschal III. The title CALIXTUS III. was also assumed by Alfonso Borgia, elected pope 1455.

Calixtus, GEORGE, theologian, was born in 1586 in Sleswick. In 1614 he became professor of theology in Helmstedt University—an appointment that he was in danger of losing when, at the religious conference of Thorn, in 1645, he was accused of apostacy. He wrote against celibacy, and advocated the amalgamation of Catholics and Protestants on the basis of the Apostles' Creed, which he strove to show embodied facts common to all Christian sects.

Calla, a genus of *Orontiaceæ*, to which the well-known *Richardia æthiopica*, the white arum or trumpet lily, was formerly referred.

Callao, the port of Lima, in Peru, is situated on the Pacific coast. It has good harbour accommodation, the entrance to which is sheltered by the island of San Lorenzo. Its exports are wool, sugar, specie, cotton, copper, bark, hides, guano, and

nitrates. This last was diminished in 1880, when Chili annexed the nitrate deposits. In 1746 the old town was destroyed by earthquake, with loss of life and serious damage to shipping.

Callcott, JOHN WALL, composer, was born in 1766 at Kensington. He was a pupil of Handel's, and in 1806 published his *Musical Grammar*. He was particularly celebrated for his glee compositions, and ranks among the most eminent in the British school of music. He died in 1821, near Bristol, while insane. SIR AUGUSTUS WALL CALLCOTT, brother, was born in 1779 at Kensington. After entering the Royal Academy as a student, he devoted his attention to portrait painting, but became known as a landscape painter. In 1806 he became A.R.A., in 1810 R.A., and in 1837 was knighted. He died in 1844.

Callernish, a village and district of Scotland, is situated on the W. coast of the island of Lewis, and is remarkable for its circles of standing stones. The chief one is 42 ft. in diameter, and is composed of stones from 10 ft. to 13 ft. high. The whole structure of which this circle is part is cruciform in shape, and its extreme dimensions are 408 ft. by 130 ft.

Callichthys, a genus of small fishes of the family Siluridæ (q.v.), with twelve species, from the rivers of tropical America, flowing into the Atlantic. The mouth is small, with a pair of barbels, which are united at the base, on each side; head covered with bony plates, body with similar protection in two rows on each side. The eggs are deposited in nests made of leaves, which the male and female guard in turn. In the hot season, when the rivers dry up, these fish bury themselves in the mud, and they are said to be able to make their way across the land to other water.

Callimachus, Greek poet, flourished about 250 B.C., was born at Cyrene, Libya. He taught at Alexandria, where he became principal librarian of the Alexandrian Library. Though he is reported to have written numerous pieces, very little of his work is now extant, viz. about seventy epigrams and six hymns. He was greatly admired by the Roman poets Catullus, Ovid, and Propertius.

Calling the Plaintiff. A plaintiff whose evidence is insufficient to establish his case can voluntarily withdraw from it. The crier of the court, on being so directed, "calls the plaintiff," and if neither he nor any one else appears for him, he is non-suited, the jurors are discharged, the action is at an end, and the defendant recovers his costs. It is equivalent to a non-suit, and the plaintiff can commence another action. [NON-SUIT.]

Callionymus. [DRAGONET.]

Calliope, one of the muses, who presided over eloquence and heroic poetry. The name means "sweet-voiced."

Callisthenes of Olynthus, philosopher and historian, accompanied Alexander the Great to India. He incurred Alexander's displeasure, and in 328 B.C. was executed on a charge of treason. Very little of his writings are extant, and the *History of the Actions of Alexander* ascribed to him is believed to belong to a later period.

Callistratus, orator, an Athenian, is said by his eloquence to have inspired Demosthenes. He sympathised with the Spartans, which led to his execution.

Callot, JACQUES, engraver, was born towards the end of the 16th century at Nancy. About 1612 he became a pupil of Thomassin's at Rome in drawing and engraving. At Florence he gained a reputation by his etchings, and was patronised by the Grand Duke of Tuscany. Invited later to Paris by Louis XIII., he executed etchings of the siege of Rochelle for that monarch. He designed and executed some 1,600 pieces during his astonishingly active career, among which the *Miseries of War*, a series of eighteen plates, and the *Gypsies* are particularly famous. He died in 1635 at Nancy.

Calluna. [HEATHER, LING.]

Callus. [FRACTURE.]

Calmet, AUGUSTINE, historical writer, was born in 1672, in Lorraine. In 1689 he joined the order of the Benedictines, becoming the head of several monasteries in succession. He compiled voluminous works, among them a *Commentary on the Bible*, *Historical and Critical Dictionary of the Bible*, *History of the Bible and of the Jews*, and a *Universal History*. He died in 1757 at Paris.

Calne, an English market town in Wiltshire, and until 1885 a parliamentary burgh, is the centre of the famous Wiltshire bacon-curing industry. In the 10th century a meeting was held here by St. Dunstan on the subject of celibacy among the clergy. The floor of the meeting house gave way, and all St. Dunstan's opponents were precipitated to the ground. Pop. (1901), 3,456.

Calomarde, DON FRANCISCO TADEO, DUKE, statesman, was born in 1775 at Villel in Aragon. Under Ferdinand VII. he acquired a position of great power, and favoured a reactionary policy, re-opening the monasteries and shutting up the universities. He was instrumental in reviving the Salic Law, whereby Christina was excluded from the throne. During the queen's regency at the time of Ferdinand's illness and death in 1833, he was suspected of intriguing with the Carlists, and having already excited the hatred of the nation, he was obliged to flee. He sought refuge in France, where he died in 1842 at Toulouse.

Calomel, a chloride of mercury, HgCl, which is found native, but is chiefly obtained by heating mercurous sulphate with common salt, $Hg_2SO_4 + 2NaCl = 2HgCl + Na_2SO_4$. It is a white powder with a slight yellowish tint, which can be easily sublimed; crystallising after sublimation in prisms of sp. gr. 7·2. It is insoluble in water, and is blackened by ammonia (hence the name, *kalomelas*). When used for medicinal purposes great care has to be taken to completely free it from accompanying corrosive sublimate (q.v.). It is used in the manufacture of lotio nigra (black

VAN SALAR JUNG RA.

wash), and of unguentum hydrargyri subchloridi. It is an important ingredient of Plummer's pill, and is now not infrequently administered by fumigation. [BATHS.] Calomel is commonly used as a purgative, and is said to be a cholagogue. It may be used as a means of bringing the system under the influence of mercury, and was in former days much employed in combination with opium in the treatment of inflammation.

Calonne, CHARLES ALEXANDRE DE, statesman, was born in 1734 at Douai. Studying at Paris, and applying himself to the practice of the law, he in 1783 succeeded Maurepas as controller-general of the treasury. By his reckless administration, which was designed to secure the favour of the courtiers and men of power, he was obliged to increase the burdens of taxation upon the people. This led to a crisis, and in 1786 he advised the king to summon the Assembly of the Notables. The Assembly met in the following year, and Calonne's financial statement was such that he was deprived of office. He retired to England until 1802, when Bonaparte gave him permission to return to France. Here at Paris he died in the same year.

Calorescence, a term given by Tyndall to the change of the invisible dark heat rays into luminous heat rays. A beam of light may be passed through a solution of iodine in bisulphide of carbon, so as to filter off all but the dark heat rays, which will pass through unaltered. These may be concentrated to a focus by a lens and made to incandesce a piece of platinum placed there. The platinum will then give out bright heat rays, thus effecting the transformation of non-luminous to luminous heat, which means increasing the frequency of vibration of the ether-waves. [ETHER, HEAT, LIGHT.]

Caloric, the name given by the old philosophers to the subtle, imponderable fluid that heat was supposed by them to be. The *caloric theory* that heat is a substance held its ground until this century. It stated that a hot body was one in which a temporary union of the substance of the body with caloric had taken place, and that the more caloric in the body the hotter it became. To explain the fact that rubbing makes a body warm, it was supposed that such rubbing had the effect of squeezing out the caloric as water from a sponge; but Count Rumford showed that there was no limit to the amount of heat that could be obtained by rubbing two pieces of metal together, an effect evidently in opposition to the caloric theory. Also Davy pointed out that two pieces of ice when rubbed together could be readily made to melt, thus actually giving out heat and yet possessing more than at first. The conclusions arrived at by these and similar experiments both qualitative and quantitative are that the heat given to a stationary body is to be measured by the amount of energy expended on it, and that heat is only a change in the form of this energy, probably kinetic or moving energy of the molecules themselves. The term caloric is still occasionally used in a popular sense to represent heat.

Calorimeter, an instrument for measuring quantities of heat, the name of which is a relic of the old caloric theory. The type of instrument generally employed involves the measurement of heat by observation of the rise in temperature of a known mass of water when the given amount of heat is presented to it. It is often difficult to make the correct allowance for loss by radiation or conduction. Favre and Silberman's calorimeter employs mercury instead of water, and indicates the amount of heat by the amount of expansion of the mercury. The *ice-calorimeter* measures the heat by the amount of ice it will just liquefy. [HEAT.]

Calottistes, or REGIMENT DE LA CALOTTE, a club of wits in Paris during the first half of the eighteenth century. The story is that in 1702 some young officers were one day ridiculing various noted persons, when one of the company who had a headache excused himself on the ground that he "was wearing a cap (calotte) of lead." "Who has not some cap to turn his brain?" replied another, and on this suggestion a society was formed with military titles, which used to send mock commissions, often couched in extremely free language, to various distinguished people, admitting them to the "Regiment of the Calotte" on the ground of some alleged folly or eccentricity. The Regent, Louis XV., and Voltaire were among the recipients. The "regiment" lasted for about half a century, and then died out, but an imitation of it has existed at various times in the French army, in the shape of a kind of court of honour, more or less recognised by the authorities, among the officers of various regiments. The word is also used for the small skull cap worn by priests, and may have sometimes covered a contemptuous allusion to the priesthood.

Calotype Process, a photographic process by means of which a negative is obtained upon paper. It was patented by Dr. Fox Talbot in 1841. The process depends on the sensitiveness to light of silver salts. Good paper is first brushed over with a solution of silver nitrate (100 grains to the ounce), and dried. It is then floated on a solution of potassium iodide, by means of which silver iodide is formed on the paper. It is then made more sensitive by brushing over with, first, a saturated solution of gallic acid, second, a solution of silver nitrate (50 grains to the ounce), with a little acetic acid added. The paper is then ready for exposure in a camera, in the same manner as ordinary plates. After exposure it may be left to develop in the dark, or the development hastened by means of the gallic acid and silver nitrate used in sensitising. It is then washed, fixed by hyposulphite of soda, again washed and dried. It is finally waxed, to make the paper translucent, when it can be used as a negative to produce positive prints. It is needless to state that all the operations of sensitising and development should be performed by red or yellow light only.

Calovius, ABRAHAM, Lutheran controversialist, was born in 1612, at Mohrungen, Prussia. He held various professional appointments in Germany, and never ceased to attack the theological doctrines that differed from his own orthodox Lutheran

views. Among his chief works are, *Systema Locorum Theologicorum*, *Biblia Illustrata*, and *Historia Syncretistica*. He died in 1686 at Wittenberg.

Caltagirone, a city of Sicily, in the province of Catania, is one of the wealthiest places in the island, and is the seat of a bishop. Its industries embrace pottery, terra-cotta figures, and cotton.

Caltha, from the Greek *kalathos*, a cup, the name of a small genus of marsh plants, belonging to the buttercup family, of which the one British species, *C. palustris*, the marsh marigold, is the best known. They are natives of cold and temperate regions, and are characterised by having regular, cup-shaped flowers made up of five roundish petaloid sepals (golden-yellow in *C. palustris*), no petals, indefinite stamens, and a ring of follicles. The yellow perianth, with no green sepals, at once distinguishes them from the buttercups.

Caltrap, CALTROP, GALTRAP, or CHEVAL-TRAP. This last rendering (though not the most generally accepted form of the name) is a ready explanation of the term. Caltraps are by no means unfrequent charges in heraldry, and were made of iron, each with four points so placed that whichever way the instrument might lie upon the ground one point would be always erect. They were formerly used in warfare, and thrown in the way, to prevent the enemy's cavalry pursuing an army on its retreat. When the point is bloody it is termed "embrued at the point." The caltraps in the compartment standing upon which the supporters of the Earl of Perth are depicted, with the motto "Gang warily," are said to be borne in commemoration of the defeat of the English—due in a large measure to the use of these weapons—at the battle of Bannockburn.

CALTRAP.

Calumba. The dried root of an African tree, Jateorhiza Calumba. The pharmacopœial preparations are an extract, infusion, and tincture. They are largely used in dyspepsia.

Calumet, a kind of pipe used by the North American Indians for smoking. The bowl is usually made of soft red soapstone, and the stem is profusely ornamented with feathers and beads. It is used symbolically as the emblem of peace: if the calumet is accepted when offered it is a sign of peace, if rejected it is a sign of war.

Calvados, a French department in Lower Normandy, is bounded on the N. by the English Channel, east by Eure, S. by Orne, and W. by Manche. Its surface covering an area of over 2,000 square miles, comprises extensive plains and fertile valleys. Along the coast is a dangerous ridge of rocks called Calvados, after the *Salvador*, one of the vessels of the Spanish Armada wrecked here. From this circumstance the whole department was named. Its chief rivers are the Touques, Orne, Dives, Seulles, Divonne, and Vire; and chief towns, Caen, Bayeux, Falaise, Honfleur, Lisieux, and Trouville. Its principal products are coal, marble, firestone, corn, and fruit. Rich pastures also abound, cattle, sheep, horses, and hogs being reared.

Calvaert, DENIS, painter, was born in 1555 at Antwerp, where he studied landscape painting, removing subsequently to Bologna. Here he opened a school, among the pupils of which were such celebrated men as Guido and Domenichino. The special merit of Calvaert's pictures is the power of grouping and colouring they exhibit. He died in 1619 at Bologna.

Calvary, anglicised from *Calvaria*, the term used in the Vulgate to translate the Hebrew *Golgotha*, a skull, is the name applied to the scene of the Crucifixion, usually identified with a small hill on the N. side of Jerusalem. It is also used in Roman Catholic countries to denote an eminence on which three crosses—the Saviour's and the thieves'—are erected in memory of the Crucifixion.

Calverley, CHARLES STUART, versifier, was born in 1833. He was the son of the Rev. Henry Blayds, who took the name of Calverley in 1852. He graduated at Cambridge in 1856, and was called to the bar in 1865, but an accident prevented him from following the legal profession. His fame mainly rests on two small volumes, *Verses and Translations*, 1862, and *Fly Leaves*, 1872. As a humorist he was unrivalled, and his translations from the Latin into English, and English into Latin, display a rare classical scholarship. He died in 1884.

Calvert, GEORGE HENRY, author, was born in 1803 in Maryland. The versatility of his genius is shown by his works, which embrace comedies, essays, poems, tragedies, translations, and works on leading English poets, and on Goethe. Died 1889.

Calvin, JOHN, reformer, was born in 1509 at Noyon in Picardy. Dedicated early to the Church by his father, who held certain ecclesiastical offices, he at the age of twelve was appointed to a chaplaincy in the cathedral church of Noyon. The income from this benefice enabled him to take up his residence in Paris, where he became the pupil of Mathurin Cordier. Thereafter for a while he studied law at the University of Orleans, where he was led, through Pierre Robert Olivetan, a relative of his own and the first translator of the Bible into French, to study the Scriptures. He soon became dissatisfied with his former religious views, and by 1529, having previously resigned his cure, he came back to Paris a decided adherent to Protestant doctrines, and had soon to fly for refuge from the persecutions that were then raging. In 1536 we find him at Basel, where he brought out the first edition of his *Christianæ Religionis Institutio*. In the autumn of the same year he joined Farel at Geneva, where the Reformation was established, but the strict morals he enforced led to a reaction, and in 1538 both he and Farel were expelled. Retiring to Strasburg, Calvin resumed his theological studies, and in 1539 married Idelette de Burie, the widow of a converted anabaptist. Recalled to Geneva in 1541, he succeeded in getting his plan of church government accepted, and

became the central authority in the city. His rigid rule and intolerant disposition is exemplified by his brutal treatment of Servetus, who, though an old friend of his own, was yet burnt alive by him on account of opinions regarding the mystery of the Trinity. In 1561 Calvin's health began to break down, and in 1564, his influence undiminished, he died. In addition to the *Christianæ Religionis Institutio*, already mentioned, his chief writings were:—*De Necessitate Reformandæ Ecclesiæ*, *In Novum Testamentum Commentarii*, and *In Librum Geneseos Commentarii*.

Calx, a term originally applied only to lime, but many metallic oxides being formed by heating ores, in a similar manner to the formation of lime from limestone, the name was extended to any metallic oxide—calx of lead, etc. The term was largely used in this sense during the 18th century, but is now not much used in chemical or metallurgical literature.

Calycanthus, a small genus of North American shrubs often seen in English gardens and forming the type of the order *Calycanthaceæ*. They have opposite entire leaves and purple or chocolate flowers in which the indefinite narrow sepals and petals and the stamens are arranged in a continuous spiral. *C. floridus* is known as Carolina Allspice, and *C. occidentalis* is a native of Carolina. The aromatic bark of the former is used as a tonic in America.

Calycifloræ, a sub-class of polypetalous Dicotyledons, named from the insertion of the petals and stamens round the margin of the receptacular tube which was erroneously termed the "calyx-tube." This insertion may be perigynous or epigynous according as the tube is free from, or adherent to, the ovary. Among the leading families in the sub-class are the *Leguminosæ*, *Rosaceæ*, *Saxifragaceæ*, *Crassulaceæ*, and *Umbelliferæ*.

Calycophoridæ, a family of the Siphonophora, pelagic, free-swimming, colonial Hydrozoa; the polymorphism of the zooids, *i.e.* the specialisation of various zooids to serve different functions, is carried to a very marked degree.

Calydonian Boar, in Greek mythology, the name given to a monstrous boar which laid waste the territory of Œneus, king of Calydon, because he had omitted to sacrifice to Artemis. It was eventually slain by Meleager, son of Œneus.

Calymene is one of the best known genera of TRILOBITES. It occurs especially in the Silurian rocks, and the species *C. blumenbachi* is so common in the Wenlock Limestone of Dudley as to be known as the Dudley locust.

Calypso, in Greek mythology, was a daughter of Atlas, and dwelt in the island of Ogygia, on which Ulysses was wrecked. She threw by her charms a spell over the wily Greek, who was induced to remain with her. At last, after a period of seven years, he was enabled to tear himself away, Calypso herself dying of grief at his departure.

Calyx, the outer floral envelope or whorl of the perianth, which is generally green and often hairy externally, serving mainly a protective purpose. In other cases it is petaloid in texture and colour, as in *Fuchsia*, especially where the corolla is absent, as in *Daphne*, *Clematis*, *Caltha*, and *Anemone*. It then serves to attract insects to the flower. The hairs may serve to exclude crawling insects which might steal the nectar without effecting fertilisation. The leaves of the calyx, which are called sepals, have a broad base, simple outline, entire margin, and acute apex. They are usually three in number among Monocotyledons and five among Dicotyledons, and may be either distinct (*polysepalous*) or coherent from intercalary growth below them (*gamosepalous*). If not adherent to the ovary, the calyx is termed *inferior*; if adherent, *superior*. In symmetry it may be *polysymmetric* or *monosymmetric*, the most striking forms of the latter type being those that are *spurred* or *calcarate*, such as those of the larkspur, *Tropæolum*, and *Pelargonium*. In duration the calyx may be *caducous*, as in poppies, falling as the flower opens; *deciduous*, as in the cherry, falling with the petals and stamens after fertilisation; or *persistent*, remaining in the fruit stage. In the latter case it may be either *marcescent*, or shrivelling, as in the gooseberry and medlar; or *accrescent*, growing larger around the fruit, as in the winter-cherry.

Cam, a plate fitted on to a revolving shaft so that the pressure of its rim against a rod bearing against it may produce an alternating motion of the rod. The motion may be rendered complex by making the circumference of the cam irregular.

Cam, or GRANTA, a river of England, rises in Essex, and after a course of about 40 miles joins the Ouse near Ely. It gives its name to the town of Cambridge.

Cambacérès, JEAN JACQUES RÉGIS DE, Duke of Parma, was born in 1753 at Montpelier. Brought up as a lawyer, he received various judicial offices under the National Convention, whose right to condemn the king he denied. As president of the Committee of Public Safety, in 1794 he helped to bring about peace with Prussia and Spain. His moderation made him an object of suspicion to the advocates of extreme measures, and in 1796 he was obliged to withdraw from the presidency of the Five Hundred. After the revolution of the 18th Brumaire (9th November, 1799) he was appointed second consul, and faithfully served the interests of Napoleon, by whom, on the establishment of the empire, he was made Arch-Chancellor, and in 1808 Duke of Parma. In 1816, for having shared in the execution of Louis XVI., he was banished, but in two years was permitted to return. His *Projet de Code Civil* formed the basis of the *Code Napoléon*. He died in 1824 in Paris.

Cambay, or KAMBAY, a town of India and capital of the state of Cambay, is situated at the head of the Gulf of Cambay. Formerly it was a flourishing port, but the difficulties in the way of navigation have led to its decay. Its chief exports are agate, cornelian, and onyx ornaments. The state, which is in Guzerat, covers an area of about 350 square miles. The gulf is shallow, and stretches

inwards for about 80 miles. Its tides run as high as 30 feet, leaving the bottom almost dry at low water.

Camberwell Beauty, a rare and irregularly distributed British butterfly, known as *Vanessa antiope*. It is of a brownish puce colour, with a dull white band on the hinder margins of the wings.

Cambium, from a Latin word meaning to change, is a name which was originally applied to all those tissues in plants which, retaining the protoplasm in their cells and their originally thin walls, are capable of undergoing cell-division and thus growing. These are now collectively called *meristem* (q.v.), the term cambium being restricted to that ring of meristem that occurs between the wood (xylem) and bast (phloem) of exogenous stems, *i.e.* those of gymnosperms and dicotyledons. This ring is partly *fascicular*, or formed within the fibro-vascular bundles, partly *interfascicular;* and its elements, which are often elongated, form either wood-cells on its inner surface or phloem-cells externally. The name *pericambium* is applied to the merismatic inner layer of the cortex of roots; *procambium*, to the elongated narrow cells that foreshadow the whole fibro-vascular bundle; and *cork-cambium*, to the phellogen or merismatic layer of cortex which forms secondary cortex or periderm.

Cambodia, or CAMBOJA, a French dependency in Indo-China, is bounded on the north by Siam, on the east by Anam, on the south by French Cochin-China, and on the west by the Gulf of Siam, along which it extends for 200 miles. Covering an area of over 30,000 square miles, its surface is for the most part flat, consisting of alluvial plains, which in the rainy season become submerged. The chief river is the Mekhong, and lake the Bien-Hoa. The principal product is rice, which is grown in large quantities. Cattle are also abundantly reared, and gold and precious stones found. Among its fauna are the elephant, bear, tiger, rhinoceros, panther, etc., and large quantities of wading birds. The chief town is Pnom-Penh. Cambodia is a kingdom of great antiquity, and its ruins show a greatness that it does not now possess. Its area, too, was formerly larger than now, but had been encroached on by Siamese and Anamites to such an extent that Cambodia became practically a Siamese province, until in 1864 the French re-established its freedom and took it under their own protection.

Cambojans, the dominant race in the ancient kingdom of Camboja, Indo-China, resembling their Siamese and Annamese neighbours in general appearance, but distinguished from all other Indo-Chinese peoples in several particulars, and especially in their language, which is neither isolating, monosyllabic, nor spoken with tones like the Chinese, Siamese, and all other members of that family. Its affinities seem to be rather through the Cham with the Malayo-Polynesian, which probably spread from South-East Asia over the oceanic world in prehistoric times. It has long been cultivated and written in a character based on the Pali (later Sanscrit), introduced by the Hindu missionaries (both Brahman and Buddhist) nearly 2,000 years ago. Under these missionaries the Cambojans became civilised, established a powerful empire which at one time embraced a great part of Indo-China, and erected the stupendous monuments of Angkor Vat and other structures scattered in profusion over the now deserted shores of the Great Lake. But this civilisation was ruined by the continual encroachments of the Annamese from the east and the Siamese from the west, and the kingdom reduced to its present narrow limits in the Lower Mekhong Valley. The Cambojans themselves have also degenerated, and are now a feeble, apathetic people, with little national sentiment, and scarcely a memory of their former greatness. The name Camboja is now little used, the inhabitants generally calling themselves *Khmer*, and the country *Khmer Srok* or *Khmer Nocor*. Still Kampushea, whence the *gamboge* of commerce, occurs in old MSS., in the royal titles at the head of official documents; it has been wrongly identified with the Kamboja of Sanscrit geography, which lay to the north-west of India; it appears to contain the same root as Khmer, of which the Siamese form is Kammen, whence Kam-puoch, Kampush, "People of Kam," from puoch—race, people. At present the Cambojan nation numbers about 1,000,000, that is, 800,000 in the kingdom of Camboja, and 200,000 in the conterminous provinces of Siam. *See* E. Aymonier, *Le Cambodge*, 1876, and Keane, *Indo-Chinese and Intercceanic Races and Languages.*

Camborne, a town of England in Cornwall, mainly devoted to the mining of tin and copper. Pop. (1901), 14,726.

Cambrai, a fortified town of France in the department of the Nord, is situated on the Scheldt. It is the seat of an archbishop, and among its chief buildings are the cathedral, in which is a monument to Fénélon, a former archbishop; the archiepiscopal palace, town hall, and public library. Cambrai has long been celebrated for its fine linen fabrics, thence called *cambrics*. It was the Camaricum of the Romans, and one of the chief cities of the Nervii. The League of Cambrai was formed here in 1508, and was a pact between Louis XII. of France, the German Emperor Maximilian, and Ferdinand of Spain, joined in 1509 by Pope Julius II., against the republic of Venice.

Cambria, the ancient name of Wales, is derived from Cymry, the branch of the Celtic race to which the Welsh belong.

Cambrian System, the name applied by Sedgwick about 1834 to the great series of slaty rocks and limestones in North Wales, then believed to be older than the Silurian of Murchison. Sedgwick afterwards made three divisions, Lower, Middle, and Upper Cambrian, the Lower being the Cambrian of Murchison, the Middle being the Primordial Silurian of Murchison, or Upper Cambrian of more recent authors, and the Upper being the Lower Silurian of Murchison or Ordovician of Lapworth. Recent tabulation of the species of fossils shows that there are three distinct faunas below the Old Red Sandstone, so that the names

Cambrian, Ordovician, and Silurian may well be limited by them. As thus restricted the Cambrian rocks of North Wales consist of purple, reddish-grey, and green slates, grits, sandstones, and conglomerates, estimated at 25,000 feet thick and mostly unfossiliferous, though yielding altogether nearly 200 species belonging to 60 genera. They seem universally to rest, as at Bangor, unconformably upon older [ARCHÆAN] rocks (fragments of which occur as pebbles in the conglomerates) and are very uniform in character, slates, greywackes, quartzites, and conglomerates, over the whole world. Often ripple-marked, sun-cracked and false-bedded, they have been formed in shallow water, possibly in inland basins. They are often cleaved, highly inclined, or folded. The fossils, considering that they are the earliest undoubted traces of animal life, are singularly varied, comprising sponges, cystideans, polyzoans, brachiopods, heteropods, pteropods, pelecypods, cephalopods, annelids, and ostracods, though trilobites are by far the most numerous. From the prevalence of the two genera of this group *Paradoxides* and *Olenus*, the Cambrian has been divided into two divisions, the Lower or Paradoxidian, and the Upper or Olenidian. The Lower Cambrian consists of the Harlech and Longmynd groups of Wales and Shropshire, with the Barmouth sandstones and Llanberis and Penrhyn slates, and the Menevian beds, named from the Roman name of St. David's. The Upper Cambrian comprises the Lingula Flags, so named from the brachiopod *Lingula Davisii*, in which the gold and copper ores of North Wales occur, and the Tremadoc slates. Igneous rocks are associated with them. Upper Cambrian rocks appear in the Malvern Hills. There is no marked unconformity in the Cambrian system, but a slight one above it. In North America Cambrian rocks are divided into Acadian and Potsdam, and they are well represented in Brittany, Normandy, the Ardennes, Sweden, and Bohemia, but appear to thin out eastward.

Cambric (from *Cambrai*, where it was originally made), a kind of fine linen, first introduced in the 16th century. The term is also applied to a coarser imitation of fine cambric.

Cambridge. 1. A town of England, capital of the county of Cambridgeshire, situated on both sides of the Cam. Apart from its famous university (the beginnings of which are placed in the 12th century) it possesses few features of general interest. The streets, with some exceptions, are narrow and winding, and among its edifices the most interesting are its churches. St. Benedict's, for instance, exhibits in its tower one of the finest specimens of Saxon architecture known as "long and short work," and the church of the Holy Sepulchre, built in 1101, in imitation of the church of the Holy Sepulchre at Jerusalem, is the oldest of the four round churches in England. Among modern churches, the Roman Catholic church, built in 1887, and dedicated to "Our Lady and the English Martyrs," is a handsome building. Cambridge is an old town, having been the site of a Roman station, *Camboritum*, traces of which still remain, and of the Saxon town, Grantabrygge. Its trade is determined by its situation in an agricultural district, and largely dependent upon the custom of the resident members of the university. (Pop. 1901, 38,393.) 2. A city of the United States in Massachusetts, is a suburb of Boston, from which it is separated by the Charles river. Though one of the oldest towns in New England, having been first settled in 1630, it is yet well laid out with spacious streets and wide open spaces. Amongst its institutions the most important is Harvard University, and it is a centre in the book-making trade in America. For many years it was the home of Longfellow.

Cambridgeshire, an inland county of England, is about 47 miles long and 30 broad, being thus one of the smaller counties, and covering an area of 820 square miles. Its surface is for the most part flat, and is traversed by the Cam, Ouse, Nene, and Larke, its principal rivers. It is an agricultural county, quite nine-tenths of its area being under cultivation, the rest being fen land, where horses, cattle, and sheep are reared. It is famed for its butter and cheese, and its manufactures are entirely related to its needs as an agricultural district. Its chief towns are, besides the county town, Cambridge, Ely, Wisbech, Newmarket, and March. It is rich in Roman remains—traces of camps, villas, coins, urns, etc., having been discovered. It was also the scene of sanguinary struggles between the Danes and the Saxons, and the Isle of Ely withstood the Conqueror for eight years. (Pop. 1901, 200,681.)

Cambridge University. This is a society of students in the liberal arts and sciences incorporated by the name of "The Chancellor, Masters, and Scholars of the University of Cambridge." "In this Commonwealth are seventeen Colleges and two Public Hostels." It is controlled by statutes, the present having been confirmed by Queen Victoria in Council in the year 1882. Subject to these it has powers of self-government. The legislative body, called the *Senate*, consists of all persons (male) who have attained, at least, to the degree of Master of Arts or some equivalent one, and retain their names upon the University Register. They are between 6,000 and 7,000 in number. A vote of the Senate is called a *Grace*, its meeting a *Congregation*. Members of it resident for more than fourteen weeks in the year within a mile and a half of Great St. Mary's church, together with certain officials, form a body called the *Electoral Roll*. By this body a *Council* is elected, consisting of the chancellor, vice-chancellor, four heads of colleges, four professors, and eight other members of the Senate. Every Grace offered to the Senate must be previously sanctioned by the Council.

The chief officials of the University are:—A *Chancellor*, a *High Steward*, a *Vice-Chancellor*, the *Sex Viri* (a court of six members, with the vice-chancellor, for offenders no longer *in statu pupillari*), a *Public Orator*, a *Librarian*, a *Registrary*, an *Assessor* (to assist the vice-chancellor *in causis forensibus*), two *Proctors* (who, among other functions, are guardians of the public

peace and of morals in the University), four *Pro-proctors* (their assistants), two *Moderators* (appointed to conduct the mathematical examinations), two *Esquire Bedells*, attendants on the chancellor or vice-chancellor; two *Members*, representatives of the University in Parliament, and sundry other officials.

For purposes of giving instruction, Professors are appointed (generally by the University) in various branches of learning, with subordinate teachers, designated Readers, Lecturers, etc. For the management of different departments, the discussion of propositions, and the like, committees, called *Syndicates*, and boards are appointed by the Senate; but these must refer all matters of importance to it for sanction. Almost all the members of the Senate and of the junior students of the University (persons *in statu pupillari*) belong to colleges, but some of the latter are members either of hostels or simply of the University. The *undergraduates* (students preparing for a degree) number nearly 3,000, about nine-tenths being members of colleges.

Each college is a corporation in itself, governed by statutes sanctioned by the Crown, capable, like the University, of holding landed and other property. Its revenues, after the payment of all necessary expenses (including contributions to the University), are divided among the members of the corporation. These are (1) a Master, (2) the Fellows, (3) the Scholars; the last being still *in statu pupillari*; from these, as a rule, the Fellows are selected, both distinctions being the reward of learning. The college is governed by the Master and the Fellows, or certain of the Fellows. Students at a college who do not belong to the Foundation are called Pensioners; these, of course, are in the majority. In most colleges a few students are received (on the ground of poverty as well as of learning) at a much reduced charge. These are called Sizars. Much of the instruction of the students is carried on within the walls of the colleges by tutors, lecturers, and other officials, appointed by their respective governing bodies. This is especially the case in such subjects as classics and mathematics. As a rule, the University requires from a student only certificates of due residence and good behaviour (given by his college) before admitting him to an examination. In certain cases, however, attendance upon the lectures of a University professor is demanded. A college has no power of conferring a degree, and is bound by the general laws of the University, but, subject to these, has full authority over its members in all things lawful. The University, like the colleges, awards scholarships, money rewards, and prizes, but not Fellowships.

Information as to the early history of the University of Cambridge is very scanty, and much of it is legendary. By whomsoever and in what manner founded, the University of Cambridge appears to have been in existence early in the thirteenth century. Probably its development was gradual, and its origin was a school conducted by monks of the Benedictine order in connection with the conventual church at Ely. Thus Cambridge may have been a place of study prior to the days of King Alfred, but the existence of a University in anything like the modern sense of the word must be placed much later. The earliest authentic legal instrument containing any recognition of Cambridge as a University is a writ dated in the second year of Henry III. (1217). Other religious orders joined in the work of education, but some colleges from the first were secular foundations. The Franciscans settled at Cambridge about 1224, the

KING'S COLLEGE CHAPEL, CAMBRIDGE.
(*From a photograph by Messrs. G. W. Wilson & Co., Aberdeen.*)

Dominicans fifty years later; the Carmelites came about the middle, the Augustinians near the end of the century. The University at this era was not a place of peace. The students not seldom were in conflict one with another and with the townsfolk, and these broils sometimes terminated in formidable riots, during which the buildings of the University and the colleges were occasionally sacked or even destroyed with their contents. Hence, probably, the paucity of early records. On one occasion a number of the students actually migrated for some time to Northampton. Gradually the University began to assume something of its present form, notably after the suppression of the monasteries, but the statutes granted by Queen Elizabeth in 1570, by which it was long governed, mark, perhaps, one of the most important epochs of change. The statutes of the colleges also have been altered from time to time, those at present in force dating from or about the year 1882. Religious tests have been abolished in the case of all degrees, except those in divinity, and of almost all offices and emoluments in the University or the colleges.

The University confers degrees in the following subjects:—Arts, Laws, Medicine, Surgery, Divinity, Science, Letters. Residence is not required for degrees in Music. In Arts, Surgery, and Laws, the degrees conferred are—firstly, Bachelor, and

secondly, Master; in the last, that of Doctor also. In Medicine, Divinity, and Music, the degrees are Bachelor and Doctor, but for the second subject a degree in Arts must have been already taken. The degrees of Doctor in Science and Doctor in Letters are granted under certain conditions. The University has the power of conferring honorary degrees. In order to obtain the degree of Bachelor of Arts a student is required to reside within the precincts of the University at least three-fourths of nine terms. In each year are three terms. The first begins on October 1st, the third ends in the latter part of June. They amount at least to 227 days. He must also pass certain examinations. The first, or *Previous Examination*, may be passed in the first term of residence; the second, or *General Examination*, in at least the fourth term of residence; the third, or *Special Examination* (in some single subject such as Chemistry, Political Economy, History, etc.), in the ninth term of residence. But if a student wish to obtain a degree in Honours he may present himself, after passing the previous examination (with certain additional papers), for examination in one of the following subjects:—Mathematics, Classics, Moral Sciences, Natural Sciences, Theology, Law, History, Semitic or Indian or Mediæval and Modern Languages. To the result of these examinations the name of *Tripos* is given. (The title of Senior Wrangler in the Mathematical Tripos was given for the last time in 1909.) The successful candidates are divided into three classes. The examination in some of the above subjects is now divided into two parts, but it is not generally necessary to pass the second of these in order to obtain a degree. For the Bachelors' degrees in Medicine and Divinity there are special examinations. There are examinations or other methods of ascertaining competency for all the higher degrees except those of Master of Arts or of Law, which are conferred on persons, otherwise duly qualified, after an interval of three years from their first degree.

The formal admission of a student as a member of the University is called *matriculation*. The majority of the students occupy rooms in their colleges, but not a few, with all non-collegiate students, are resident in licensed lodgings. They may remain, under conditions, during the vacations, and many students do so for part of the summer or *Long* vacation, when arrangements are made for instruction (in some cases by formal lecturing), or the services of *private tutors* can be obtained. The details of the methods of instruction and the social life of the University and colleges are too complicated for description within the limits of this article. It must suffice to say that the college is, to a large extent, both intellectually and socially, a unit. Within its walls a student might receive all his instruction and find all his companions; though, probably, such a case would be uncommon as regards the former, and very rare in respect to the latter. Among the various colleges a healthy and friendly rivalry exists, as between the masters' houses in a large public school.

Almost all the academical buildings in Cambridge are on the right bank of the river Cam. Roughly parallel with it is one of the principal streets in the town, and for a considerable distance the ground between them is almost wholly occupied by these buildings; the college gardens, fringing the water, being popularly termed *the Backs*. This street, at its northern end, joins the other main street of Cambridge, which leads to the railway station. Along it, or between the two, most of the other academical buildings are situated. The following are the chief university buildings:—(1) The Senate House, a hall for meetings and examinations, opened in the year 1730. (2) The Schools, Public Library and Geological (Woodwardian) Museum, an extensive group of buildings, of various dates from the fifteenth to the nineteenth century, chiefly occupied by the valuable library of the University, containing more than 250,000 volumes. The geological collection is also a very fine one. Opposite to the Senate House is St. Mary's or the University church, in which sermons are delivered by specially appointed preachers, and exercises for degrees were formerly held. These form a group. The Selwyn Divinity Schools, near St. John's College, were completed in 1879. The New Museums are an extensive group of buildings, erected mainly during the nineteenth century. In these the departments of chemistry, mineralogy, botany, comparative anatomy, zoology, physiology, and human anatomy are accommodated, the collections in their museums being in most cases very fine. Certain mathematical professors and the professor of engineering are also accommodated. Close to these buildings is the Physical (Cavendish) Laboratory, erected about 1872, the gift of the Duke of Devonshire, Chancellor of the University. The Fitzwilliam Museum, a fine "classical" structure, opened in 1848, was erected from funds, and contains a collection of pictures (with others), bequeathed in 1816 by Viscount Fitzwilliam. A museum of Archæology was erected, at no great distance, in 1884. The Botanic Gardens are on the southern side of Cambridge; the Observatory, which lies to the north-west, was completed in 1824. Other institutions connected with the University are its Printing Press (built 1833), and Addenbrooke's Hospital.

The colleges enumerated in the order of their foundation are as follow; several, however, of these were constituted from one or more older institutions: (1) St. Peter's College (Peterhouse), founded in 1257; master and eleven fellows; buildings of various dates, the more conspicuous 17th and early 18th century. (2) Clare College, founded 1326; master and fifteen fellows; buildings form one court, chiefly 1635–56. (3) Pembroke College, founded 1347; master and thirteen fellows; an extensive group of buildings of various dates, but a large part has been erected since 1870. (4) Gonville and Caius College, founded 1348; master and twenty-two fellows; three courts, parts dating from the 15th century, but very much rebuilt between 1850 and 1870. (5) Trinity Hall, founded 1350; master and thirteen fellows; two courts with annexes, 18th and 19th centuries. (6) Corpus Christi College, founded 1352; master and twelve fellows; two courts, one chiefly 14th century, most of the rest 1823–7. (7) King's College, founded

1441; provost and forty-six fellows; the chapel was built 1446–1515, most of the magnificent windows of stained glass were made about 1530; of the other buildings, one block 1724, the rest of the nineteenth century. (8) Queens' College, first foundation 1448; president and thirteen fellows; two principal courts, a considerable part of the buildings dating from later half of 15th century, with subsequent alterations and additions. (9) St. Catharine's College, founded 1473; master and six fellows; one court with annexe, buildings chiefly from 1674 to 1757. (10) Jesus College, founded 1496; master and sixteen fellows; three courts, the chapel is part of the conventual church of St. Radegund, much of it *circ.* 1200; of the buildings, considerable portions, *circ.* 1500, with alterations and additions, especially since 1869. (11) Christ's College, founded 1505; master and fifteen fellows; main court erected *circ.* 1510, but transformed in 18th century, restoration of recent date, block of buildings at back about 1640. (12) St. John's College, founded 1511; master and fifty-six fellows; four courts with annexes; some of first court *circ.* 1510, partly altered 1772, and again about 1865 (new chapel); second court, 1599; library, 1624; rest of third court about 1670; the fourth, connected by a covered bridge over the Cam, about 1830. (13) Magdalene College, founded 1519; master and seven fellows; main court, partly *circ.* 1520, with great alterations in 18th century, and restorations about 1875. (14) Trinity College, founded 1546; master and sixty fellows; five courts; the main court (the largest in Cambridge) of various dates, some older, mostly in latter half of 16th century, with recent restorations; second court about 1614, with library 1680; third court about 1825, two small courts across the street 1860–73. (15) Emmanuel College, founded 1584; master and thirteen foundation fellows; one court with annexes, various dates from 1633 to 1871. (16) Sidney Sussex College, founded 1598, master and ten fellows; two courts, various dates from 1596 to 1833. (17) Downing College, founded 1800; master, two professors, and six fellows; buildings of 19th century.

Of the public hostels, both Cavendish College and Selwyn College were thus constituted in 1882; the buildings of both are modern. Ayerst Hall, opened in 1884, is a hostel. Ridley Hall, for graduate theological students, is also modern.

The University now offers many facilities to women desiring advanced education, and those resident at either Newnham College or Girton College are admitted to its examinations. "*Local*" examinations are held by the University at various centres, to which boys and girls (juniors under 16, seniors under 18 years of age) are admitted. Also "*Higher*" examinations for men and women. The University also grants certificates of proficiency in various subjects, examines schools, and arranges for the delivery of lectures in various parts of England.

Cambuscan, a corruption of the name Genghis Khan, used in Chaucer's *Canterbury Tales* as Cambynskan. Milton gives it this form in *Il Penseroso*:—

> "Or call up him that left half told
> The story of Cambuscan bold."

Cambyses, king of the Persians and Medes, and son of Cyrus the Great, ascended the throne on the death of his father in 529 B.C. A few years afterwards he conquered Egypt. His subsequent efforts, however, had far from so happy an issue. The army he sent against the Ammonites perished in the desert, and a later expedition into Nubia, led by himself, suffered severe losses unaccompanied by corresponding conquests. These misfortunes affected his disposition, and he gave way to dissipation and cruel treatment of his subjects, murdering even his brother Smerdis. He died in 521 B.C.

Camden, a town of New Jersey, and capital of Camden county, is situated on the Delaware river. It stands opposite Philadelphia, with which it is connected by various lines of steamboats. It is a manufacturing centre, having iron foundries, woollen and cotton mills, ship-yards, etc. It is also the terminus of several railways. It was long the home of the poet Walt Whitman.

Camden, CHARLES PRATT, EARL AND VISCOUNT BAYHAM, was born in 1713. Called to the bar in 1738, he became attorney-general in 1757 and chief justice of the Common Pleas in 1762, having been an unknown man until, in 1752, he successfully defended a bookseller, William Owen, in a charge of libel against the House of Commons. He gained great popularity through his expressed views of the prosecution of John Wilkes. He was the judge before whom Wilkes was tried, and he very decisively pronounced against the course of the Government as altogether illegal. Created Baron Camden in 1765, he was in the following year appointed Lord Chancellor, resigning on account of differences with the policy of the Government in 1770. He subsequently held office as President of the Council under Rockingham in 1782, and again under Pitt from 1783 to 1794, the year of his death. Meanwhile, in 1786, he had been created Earl Camden and Viscount Bayham.

Camden, WILLIAM, antiquarian and historian, was born in 1551 in London. Educated at Christ's Hospital, St. Paul's school, and Oxford, he in 1575 became second master of Westminster school. Here it was that he began to collect the material for his *Britannia*, a book that gives an historical and topographical account of the British Isles from the earliest times. It was published, after 10 years' labour, in 1586, and was at once bought up, winning a great reputation for the author, and by 1607 having reached its sixth edition. In 1593 Camden became head-master of Westminster grammar school, and in 1597 Clarencieux King-at-arms in the Herald Office. Among his other works the chief were a history of the reign of Queen Elizabeth, an account of the Gunpowder Plot, and a collection of the epitaphs in Westminster Abbey. All his books were written in Latin. He died in 1623 at Chislehurst—in the house subsequently occupied by Napoleon III. during his residence in England. The "Camden Society," founded in 1838, was named in his honour.

Camecran, the collective name of five Brazilian tribes, who inhabit the forests between the

provinces of Para and Goyaz. The several tribes are Chr-, Crore-, Ma-, Pio-, and Pore-Camecran. When José Pinto de Magalhaes founded the settlement of Alcantara, on the right bank of the Tocantins, in 1809, he contracted an alliance with the Ma-Camecrans, by whose aid all the others were reduced, and have since been for the most part mansos (civilised). They appear to be a branch of the great Guarani-Tupi family, although the language differs greatly from Guarani.

Camel, any individual of the Old World genus Camelus, which with Auchenia (q.v.) constitutes the family Camelidæ, equivalent to the modern Tylopoda, an aberrant group of Ruminants. None of the family is horned; the usual callous pad in the upper jaw is replaced in the type-genus by three, and in Auchenia by two, teeth on each side. The feet have two toes, each covered on the upper surface only with an imperfect nail-like hoof. The hinder surfaces of the toes, on which these animals walk, are directed downwards, and enclosed in callous pads (whence the name Tylopoda). The stomach differs from that of other Ruminants in having only three instead of four compartments, the manyplies, or psalterium, normally the third, being absent. On the walls of the paunch are two aggregations of cells, covered at the mouth with a muscular membrane, in which is an oval opening, capable of dilatation or contraction, probably at will. In these cells the Arabian camel can store some six quarts of water (to obtain which the Arabs have often slaughtered the animal). The second stomach, or honeycomb bag, has very deep cells, and is probably also used as a receptacle for water, since food is never found in it after death. The home of the family, which dates back to the Miocene, appears to have been North America, whence the living species could easily have been derived. In the type-genus the muzzle is hairy, the upper lip cleft, and the nostrils may be closed at will, so as to afford protection against clouds of sand or dust. There are callosities upon the chest and the joints, on which the animal kneels to rest or to receive its burden, and since these callosities are found in new-born calves, it seems clear that a modification to meet a certain want has become permanent. The camel is a huge, ungainly beast, with long neck and limbs, a hump or humps on the back, having the coat scanty in the summer and long and matted in the winter. The true, or Arabian camel—the "Ship of the Desert" (*C. dromedarius*)—is a native of Asia and Africa. It is often called the dromedary, but that name should be applied only to a swift variety used for riding, and not as a beast of burden. The hair is grey, with a reddish tinge, and there is a single hump. These humps are accumulations of fat, which are really reserve stores of food, and the size of the hump is a sure sign of the animal's condition. Camels are of immense value to the Arabs, who not only use them for travelling and carrying goods, but make the milk into butter and cheese, the hair into fabrics for clothing and tent-covers, and the skin into leather, while the flesh is used as food. The average load for a camel is about 600 lbs., and its pace is from two to three miles an hour; the usual distance covered in a day by a dromedary is about 100 miles, and its rate is often ten miles an hour. This is the species mentioned in Scripture, and figured in ancient sculpture. Napoleon employed Arabian camels in his Egyptian campaign. In 1885 the British followed his example, and "camelry," to signify soldiers mounted on camels, is now a recognised word in the language. The Bactrian Camel (*C. bactrianus*), a native of Central Asia, has two humps, and is more heavily built than its congener, though a small race exists in the Kirghiz steppe. Camels are extremely hardy, able to subsist on anything in the shape of herbage, and to support long periods of drought owing to the peculiar arrangement of the stomach for storing water. They are often said to be docile and patient; though some writers deny this, and a recent authority describes them as "never tame, though not wideawake enough to be exactly wild." On the other hand, instances are on record of their harbouring resentment and taking revenge for ill-treatment.

Camel, a vessel, generally of iron or steel, formed of two parts, and designed for raising a ship out, or partially out, of the water. One part is affixed to each side of the ship, and the camel is then pumped dry. Camels are in some places used for raising ships sufficiently to enable them to pass river bars. They were long so employed at the mouth of the Y in Holland, and between St. Petersburg and Cronstadt; but, as a rule, dredging operations and the making of canals have of late caused them to be dispensed with.

Camellia, a genus of the order *Ternströmiaceæ*, or, as they are sometimes called, *Camelliaceæ*, named by Linnæus, after Father George Joseph Kamel, a Jesuit missionary in the Philippines. It comprises some twelve known species of evergreen shrubs or small trees with glossy leathery leaves and red or white axillary flowers, which are natives of eastern Asia and the adjacent islands. Of these the best known are *Camellia japonica*, introduced by Lord Petre in 1739, and now largely cultivated for its blossoms, and *Camellia theifera*, the tea-plant. The tea-plants, formerly separated under a genus *Thea*, are only distinguished by superficial characters. [TEA.] *Camellia japonica* seeds freely in southern Europe, so that many hundreds of seedling varieties have been raised. Camellias require a rich porous soil, frequently top-dressed, and a great deal of water when growing or flowering, but not much heat or light.

Camel'opard, the English form of the Greek name for the giraffe (q.v.), from its somewhat camel-like figure and its spotted skin. The old pronunciation corresponded to the erroneous formation "Cameleopard," now obsolete.

Camelot, the name of a mythical city mentioned in mediæval romances and by Tennyson.

Cameo, a precious stone, generally onyx, agate, or sardonyx, carved in relief, as opposed to an *intaglio*, which was hollowed out. Cameos were

largely made by the ancients, and the stone used was generally composed of two or more different coloured layers, and the skill of the artist was employed in exposing the various colours. Shells as well as stones are used for cameos.

Camera, in *photography*, is the apparatus required to take the photograph, that is to say, to concentrate the rays of light proceeding from the object to be photographed, to bring these to a focus on a sensitive plate or film, and to keep this plate or film steadily in position while these rays are acting on it. It consists essentially of a box, with one end holding the lens that gathers the rays, and the other end the sensitive plate. The sides are *bellows-bodied, i.e.* built of corrugated flexible material like a bellows or concertina, so as to admit of variation in the position of the plate with regard to the lens, and to enable the camera to pack up into small compass. The camera is generally carried on a tripod stand, which is very convenient for adjustment on irregular ground, and is also readily packed up. Hand cameras are now very generally used, and have of late years undergone great development.

Before the *dark slide*, containing the sensitive plate properly protected from the light by a shutter, is placed in position at the back of the camera, a plate of ground glass occupies exactly the same position as the sensitive plate is to take up subsequently. Thus, when the camera is in place, with the cap removed from the lens, and the glass plate in its proper position, the object is definitely focussed on to it, and the inverted image may be clearly seen when surrounding light is prevented from falling on it by covering the back of the camera with a *focussing-cloth*. The exact focussing, or adjustment of the plate in the position where the image on it is most clearly defined, is effected usually by a screw movement. Then the glass plate is drawn back and the dark slide slipped into its place, with the sensitive plate still covered. The cap is placed on the lens, and the shutter removed from the slide. At this instant the sensitive plate is uncovered, but the camera being light-tight, no actinic effect is produced on it. But so long as the lens is open there is exposure to the light rays from the picture. In instantaneous work the lens is only allowed to remain uncovered for a small fraction of a second, $\frac{1}{4}$th to $\frac{1}{25}$th. Cap exposures vary from $\frac{1}{4}$th of a second to an almost indefinitely prolonged period, depending on the amount of light available. For chemical aspect of photography see the article PHOTOGRAPHY.

Camera Lucida, an arrangement with many modifications, invented by Wollaston, to produce an image of an object on a plane surface such as a sheet of paper. If this image be traced out with a pencil, a correct delineation of the object results. The diversion of the rays of light necessary to produce this apparent alteration in the direction of the object is generally effected by total reflection from the inner surface of a glass prism. It may also be produced by simple reflection at an angle of 45° from a plane piece of glass held over the paper at the same angle. When the operator places himself directly over the paper he will see the image thereon. [REFLECTION, REFRACTION.]

Camera Obscura, or *dark room*, invented by Porta, a small chamber within which a clear inverted picture of the external surroundings may be presented on a screen, by a process similar to that which holds in the case of the *camera lucida* (q.v.). Light from the outside is allowed to pass through a small aperture into the chamber, and there be totally reflected on to the screen from the inside surface of a glass prism or from a plane piece of glass mirror. The image is more clearly defined if a convex lens be placed at the aperture to concentrate the rays. Many such cameras as are used in public gardens, etc., combine the lens and mirror in a single glass prism with curved faces where the light enters and leaves it, and with a plane face where the light is totally reflected within the prism.

Camerarius, JOACHIM, writer, was born in 1500 at Bamberg. His original name was "Liebhard," which he altered to Camerarius because his ancestors had been Kämmerer (chamberlains) at the Bishop of Bamberg's court. He was a friend of Melanchthon, whose biography he wrote and a collection of whose letters he published. He died in 1574 at Leipzig.

Cameron, JOHN, a learned divine, was born about 1579 in Glasgow. After holding various appointments at seats of learning on the Continent, he returned in 1620 to his native city, and became principal of the university. In less than a year, however, "being so misliked by the people," he removed to Saumur and then to Montauban, where he was appointed professor of divinity. So encyclopædic were his attainments that he has been styled a "walking library," and Milton referred to him as an "ingenious writer in high esteem." He was a persistent preacher of the doctrine of passive obedience. He died in 1625 from a wound inflicted on him by an opponent to his theological views. His followers are called Cameronites, and are a sort of moderate Calvinists, and approach somewhat to the doctrine of the Arminians.

Cameron, RICHARD, Covenanter, was born at Falkland, Fifeshire. He was at first precentor and schoolmaster in the parish church, which was then under an episcopal incumbent. He subsequently, however, espoused the cause of the most advanced section of the Presbyterians, and in 1680, at the head of a few followers, entered Sanquhar, and formally renounced allegiance to King Charles II. [SANQUHAR DECLARATION.] Retiring with his companions to the hilly country between Nithsdale and Ayrshire, he baffled his pursuers for a month, though 5,000 marks was the price put on his head by Government. On July 20th, however, he was captured, his hands and head being cut off and fixed upon the Netherbow Port, Edinburgh. After him is named the religious body called the Cameronians.

Cameronians. [REFORMED PRESBYTERIANS.]

Cameroon or **Cameroons.** 1. A river of W. Africa, in Upper Guinea, enters the Bight of Biafra by an estuary 20 miles in width, after a course of undetermined length in a south-easterly direction.

On its banks are prosperous villages, whose inhabitants do a thriving trade in ivory and palm oil. 2. A mountain range at the angle of the Bight of Biafra and opposite the island of Fernando Po. Its highest peak reaches an elevation of 13,000 ft. 3. The name is also applied to the district adjacent to the Bight of Biafra, and since 1884 belonging to Germany.

Camillus, MARCUS FURIUS, Roman patrician, celebrated for his deliverance of Rome from the Gauls, was made dictator in 396 B.C., during the war with Veii, and in 394 B.C. he induced the Falerii to surrender by magnanimously restoring to them their children. In 391 he retired from Rome on account of the envy of his enemies, but was recalled when the Gauls under Brennus (q.v.) had captured the whole of the city save the capitol. He succeeded in repelling the Gauls, and subsequently won further victories against the enemies of the republic. He died in 365 B.C., stricken with the plague. Though his life has doubtless a considerable admixture of legend about it, Camillus is yet one of the worthiest names that adorns the history of ancient Rome.

Camisards (from O. Fr. *camise-chemise*, a shirt), the name given to a sect of French Protestants who rose against Louis XIV., as a consequence of the Edict of Nantes (q.v.) in 1685. They acquired their names from the fact of their wearing their blouses outside their armour. The insurrection was not finally suppressed until 1705, after much bloodshed, and the almost complete devastation of the Cevennes, the scene of the rising.

Camoens, LUIS DE, Portugal's greatest poet, was born about 1524 in Lisbon. In 1537 he was entered at Coimbra university as one of the "honourable poor students," returning to Lisbon in his eighteenth year. Here he had the misfortune to fall in love with a lady attached to the Court, and of higher birth than his own, which led to his banishment to Santarem, and was the commencement of his subsequent misfortunes. Becoming a soldier, he served against the Moors, and in a naval engagement at Ceuta lost his right eye. Disappointed at his reception on returning to Lisbon, he set out in 1553 for India, and there wrote a satire on the Portuguese authorities at Goa, which resulted in his being banished to Macao in 1556. Here he received the appointment of administrator of the effects of absent and deceased Portuguese, and began to write his great epic *The Lusiad*, in which are sung in truly patriot strains the chief events of Portuguese history. On returning to Goa, whither he was recalled in 1561, he was shipwrecked, and lost all his property, except his manuscript; arriving ultimately in Lisbon, in 1569, as poor and friendless as he had left it. In 1572 his poem was printed, the young King Sebastian accepting the dedication. It immediately sprang into popularity, but the reward of its author was so meagre that his faithful Javanese servant had often to beg in the streets to keep the poet from starving. In addition to his epic Camoens wrote sonnets, songs, dramas, odes, and elegies. At last, in 1579, he died in a Lisbon hospital, and in such obscurity that when fifteen years later a magnificent monument was erected to his memory, the inscription on which styled him the Prince of Poets, it was with difficulty that the place where his remains lay was found. *The Lusiad* has been translated into most European languages.

Camomile, a plant of the genus Compositæ, one species of which (*Anthemis nobilis*) is much used as a tonic. The infusion known as Camomile tea was at one time largely employed by druggists.

Camorra, the name given to a secret society formed in the kingdom of Naples, and at one time exercising considerable power. It first attracted public notice in 1820; it partook of the nature of a political organisation, and of a general vigilance committee; summary penalties were exacted from real or fancied wrong-doers, and payment for services performed by the society was rigorously demanded. Under Francis II. a vigorous attack was made upon the society, which had its revenge, however, in assisting materially to overthrow the Bourbon rule. Under the present government the society has a merely nominal existence. [MAFIA.]

Camp, the place where an army halts and pitches its tents. The Roman camps used to be square, with entrenchments all round and a gate at each side. Different parts of the camp were the *Fossa*, the *Vallum*, the *Principia*, and the *Quintana* (all of which see). A *camp of instruction* is a camp formed in time of peace to instruct and discipline soldiers. A *flying camp* is one occupied for a very short time.

Campagna, a town in Italy, in the province of Salerno, stands in the centre of a mountainous district. The see of a bishop, it has a cathedral and college. It trades also in wine, oil, and fruit.

Campan, JEAN LOUISE HENRIETTE, was born in 1752, at Paris. She won the favour of Queen Marie Antoinette, whom, as lady of the bedchamber, she served with touching fidelity. After the sacking of the Tuileries she was thrown upon her own resources. To support herself and her invalid husband she opened a boarding school at Saint Germain. She is remembered mainly for her writings, *Mémoires sur la Vie privée de la Reine Marie Antoinette*, *Journal Anecdotique*, and her correspondence with Queen Hortense.

Campanella, TOMMASO, monk, was born at Stilo, Calabria, in 1568. Entering the order of the Dominicans at Cosenza, he there became attracted by the writings of Telesius, which inspired his *Philosophia sensibus demonstrata*, 1591, a defence of Telesius against the Aristotelians. This drew the attention of the authorities upon him, and after a few years of wandering he was arrested in 1599 and thrown into a Neapolitan prison, being treated with great severity. In 1626 he was liberated by Pope Urban VIII., and in 1634, in dread of further persecution, retired to France, where he enjoyed the protection of Cardinal Richelieu. He died in the Dominican monastery of St. Honoré, Paris, in 1639. He was contemporary with Bacon, and, like him, sought to reform thought by a more

extended study of nature. His chief works were, *De sensu rerum et magia*, *Atheismus Triumphatus*, *Monarchia Messiæ Jesi*, and *Civitas Solis*, in which last is outlined an ideal state, after the manner of More's *Utopia*. He also wrote sonnets of great power.

Campania, the ancient name of a province of Italy, was situated on the W. coast, with Capua as its capital. It now comprises the modern provinces of Caserta, Naples, Benevento, and portions of Salerno and Avellino. It was celebrated for its fertility, yielding abundantly of corn, wine, and oil, and for its genial climate. So favoured a spot was it that the Romans built their villas here, and Baiæ became their most fashionable resort. Besides Baiæ and Capua, other leading towns in ancient Campania were Cumæ, the earliest Greek settlement in Italy, Puteoli, Naples, Herculaneum, Pompeii, Stabiæ, and Salernum.

Campanile, in architecture, a bell-tower generally used in connection with churches, but sometimes with domestic buildings. The tower, when belonging to a church, is generally detached from the church itself. Famous examples of the *campanile* may be seen at Pisa, Florence, Cremona, and at many other towns in Italy.

Campanula, or BELL-FLOWER, a large genus of herbaceous plants giving its name to the gamopetalous order Campanulaceæ. They are chiefly natives of the north, some eight or nine being indigenous to Britain. Many of them have an acrid milky juice. Their leaves are scattered and exstipulate; the corolla regular, bell-shaped, five-cleft, and epigynous; the stamens five in number, and the fruit capsular. *C. rotundifolia* is the Harebell (q.v.); *C. Rapunculus*, the rampion, is cultivated for its edible roots; *C. Trachelium* is the nettle-leaved bellflower or wild Canterbury bell, and *C. hederacea*, the minute ivy-leaved bell-flower, is one of our most beautiful waterside plants. Several species are grown in gardens.

Campanularia is one of the best known of the British "Hydroid Zoophytes." It belongs to the class HYDROZOA, to the sub-class CRASPEDOTA, and the order HYDROIDEA. The animal consists of a delicate branched plant-like body, the end of each branch terminating in a small bud-like expansion or cup; the individual zooids live in these cups (hydrothecæ), and are connected by prolongations of the soft tissues passing through the hollows of the stem. The whole body is protected by a chitinous covering, the "perisarc": expansions of this at the free ends of the branches protect the "zooids." The reproductive organs are protected by similar expansions of the perisarc, forming buds known as the gonothecæ: in each of these is a central stalk, the gonophore, from which are given off on either side a series of buds which develop into medusæ. The development may be abbreviated, and no free medusoid form may exist; or the lateral buds may escape as small free-swimming jelly-fish, which ultimately give rise to the fixed colonial stage. Campanularia is closely allied to Sertularia (q.v.), but it differs in that its hydrothecæ are borne upon long stalks, which are marked by series of rings.

Campbell, ALEXANDER, was born in 1788 near Ballymena, county Antrim. At an early age he emigrated to the United States, where he worked as an itinerant preacher. In 1826 he issued an edition of the New Testament, substituting for "baptist" and "baptism" the words "immerser" and "immersion." He was an active propagandist of his own particular views on certain religious doctrines, and in consequence gathered quite a following. In 1827 his party became known as "The Disciples of Christ," and have since grown to have upwards of 5,000 places of meeting and more than half a million members. In 1841 he established Bethany College, West Virginia, where in 1866 he died.

Campbell, SIR COLIN, LORD CLYDE, General, was born in 1792 at Glasgow. Though the name of his father, who was a carpenter, was Macliver, he adopted the name of Campbell from his uncle, Colonel John Campbell. Through the aid of this gentleman he became an ensign in 1808, five years later, by his own merits, becoming a captain. After further promotion and active service he was appointed to the command of the Highland Brigade on the breaking out of the Crimean war. Here his exploits showed him to be one of England's bravest soldiers. Through him Alma and Balaclava were won, and for his signal services he was rewarded with a G.C.B., a sword of honour by his native city, and other dignities. During the Indian Mutiny, as commander of the Indian forces, he relieved Lucknow, and speedily quelled the rebellion. On his return to England he was made a field-marshal and given a pension of £2,000 a year, having, during his absence, been created Lord Clyde. He died in 1863 and was buried in Westminster Abbey.

Campbell, GEORGE, divine, was born in 1719 at Aberdeen, where at the grammar school and Marischal College he was educated. After officiating as parish minister at Banchory Ternan, he was, in 1759, appointed principal of his college. Three years later he published his celebrated *Dissertation on Miracles*, a reply to Hume's arguments. His next most important work was the *Philosophy of Rhetoric*, 1776, by which he is now best known. On retiring in 1795 from the offices he filled at Marischal College on account of feeble health, he received a pension from the king of £300, which, however, he did not live to enjoy long. A stroke of palsy carried him off in 1796.

Campbell, JOHN, Baron, Lord Chancellor of England, was born in 1779 at Cupar, Fifeshire, where his father was a minister. He himself was destined for the Church, but in 1798, coming to London as tutor to the son of a West India merchant, he in 1800 was entered as a student at Lincoln's Inn, and in 1806 was called to the bar. In the meantime he had been theatrical critic to the *Morning Chronicle*, and in 1808 published the first volume of his nisi prius *Reports*. These *Reports* comprise four volumes altogether, and cover the period 1807–1816. In 1810 he joined the Oxford circuit, of which he became leader in 1824. In 1821, having married the daughter of Lord Abinger, afterwards Baroness Stratheden, he rose

rapidly, becoming King's Counsel in 1827, M.P. for Stafford in 1830, Solicitor-General in 1832, Attorney-General in 1834, and Lord Chancellor of Ireland in 1841, being at the same time raised to the peerage as Baron Campbell of St. Andrews. In 1846 he was made Chancellor of the Duchy of Lancaster, and in 1859 was raised to the woolsack as Lord Chancellor. In politics he was a Whig. He is known as the author of the *Lives of the Lord Chancellors and Keepers of the Great Seal of England, from the Earliest Times to the Reign of George IV.*, and *Lives of the Chief Justices of England, from the Norman Conquest till the Death of Lord Mansfield*. He died in 1861.

Campbell, JOHN FRANCIS, writer on Highland folk-lore and scientist, was born in 1822, eldest son of Walter Frederick Campbell, of Islay, and Lady Eleanor Charteris. Educated at Eton and the University of Edinburgh, he occupied various posts under the Government, among them secretary to the lighthouse and coal commissions. He was an extensive traveller, and died in 1885 at Cannes. It is by the work of his leisure that he is known, and which he published in *Popular Tales of the West Highlands, orally collected* (1860–62), *Frost and Fire, Natural Engines, Tholmarks, and Chips, or Sketches taken at Home and Abroad by a Traveller* (1865), *Thermography* (1883), etc. He also invented the sunshine recorder, whereby the varying intensity of the sun's rays is indicated.

Campbell, JOHN MCLEOD, divine, was born at Kilninver, Argyllshire, in 1800. Brought up for the Church, he was licensed in 1821 and received a charge in 1825. In 1831 he was deposed on the ground of heresy, holding views of his own on the Atonement and cognate theological subjects. From 1833 to 1859 he preached to a body of followers that gathered round him in Glasgow, publishing in 1851 *Christ the Bread of Life*, in 1856 *The Nature of the Atonement*, and in 1862 *Thoughts on Revelation*, most highly valued books in the theological world. In 1868 he received the degree of D.D. from Glasgow University, and in 1871 was presented with a testimonial and address by representatives of most of the religious sects in Scotland. He died in 1872 at Roseneath, where he was living in retirement and occupied on *Reminiscences and Reflections*, which was completed and published by his son, the Rev. Donald Campbell, in 1873.

Campbell, THOMAS, poet, was born in 1777 at Glasgow. Educated at the university there, he in 1797 went to Edinburgh to study law. In 1799, however, appeared the *Pleasures of Hope*, which attained immediate popularity. After a visit to the Continent he wrote some of the finest lyrics known to English literature, among them *Hohenlinden*, *Ye Mariners of England*, and *The Exile of Erin*. In 1803, settling in London, he devoted himself to literary work, and in 1806, through the influence chiefly of Fox, he obtained a government pension of £200. In 1809 appeared *Gertrude of Wyoming*, *Lord Ullin's Daughter*, and *The Battle of the Baltic*. In 1819 appeared his *Specimens of the British Poets*, and in the following year he became editor of the *New Monthly Magazine*. He thereafter took an active part in promoting the establishment of London University, and in 1827 was elected Lord Rector of Glasgow University, being subsequently twice re-elected. Among his prose productions were *The Annals of Great Britain, from George II. to the Peace of Amiens*, *Letters from the South*, *Life of Mrs. Siddons*, and *Life of Petrarch*. He died in 1844.

Campbell-Bannerman, RIGHT HON. SIR H. (b. 1836), was first elected for Stirling Burghs in 1868; he was Financial Secretary to the War Office from 1871–4 and from 1880–2; Secretary to the Admiralty from 1882–4; Chief Secretary for Ireland, 1884–5; Secretary for War, 1886 and 1892–5. He was chosen to be leader of the Liberal Opposition in 1899, and in 1905, on the resignation of the Balfour Administration, became Prime Minister; the general election that followed gave him a large majority. He died in 1908.

Campbell's Act (LORD). By this statute (9 and 10 Vic. c. 93) and the amending Act (27 and 28 Vic. c. 95) the families of persons killed by accident are enabled to claim compensation. The action is for the benefit of the wife, husband, parent or child of the deceased person, and may be instituted by his or her executor or administrator; but if the executor or administrator does not, within six months of the death, commence the necessary action, then any of the persons beneficially interested, whether legally or morally only, in the result of the action, may commence the same. By a later statute than the above the Board of Trade is empowered to appoint an arbitrator in the matter.

Campbeltown, a royal and parliamentary burgh of Scotland, in Argyllshire, is situated on the E. side of the peninsula of Cantyre. In the principal street stands an interesting granite cross, said to have been brought from Iona in the twelfth century. Its main industries are fishing and whisky distilling. Pop. (1901), 8,234.

Campe, JOACHIM HEINRICH, author, was born in 1746 at Deensen, in Brunswick. In 1777 he was appointed director of the Educational Institute in Dessau, and thereafter set up an educational establishment of his own at Trittow, near Hamburg. At Brunswick he also established a thriving publishing business. He himself wrote many educational works and books for youths. He died in 1818.

Campeachy, a Mexican seaport and capital of a state of the same name, formerly in the province of Yucatan, is situated on the W. side of that peninsula, and on Campeachy Bay. Among its industries are cigar-making and ship-building. It is also a market for logwood and wax.

Campeggio, LORENZO, CARDINAL, was born in 1474 at Bologna. After engaging in the legal profession he entered the Church, and was made a bishop by Pope Julius II., who also sent him as nuncio to Germany and Milan. In 1517 he became Cardinal, and was sent to England to incite Henry VIII. against the Turks. He again visited England in 1528 to assist Wolsey in the matter of Henry's contemplated divorce from Catherine of Aragon.

and succeeded in accomplishing nothing except to incur the displeasure of all parties, and to bring about Henry's final rupture with Rome. Campeggio died in 1539 at Rome.

Camper, PETER, physician, was born in 1722 at Leyden, where he studied. He became professor of medicine successively at Franeker, Amsterdam, and Gröningen. He rendered valuable services to anatomy, medical jurisprudence, obstetrics, and surgery, and was a skilful drawer and sculptor. He also made a special study of the facial angle.

Camperdown, a tract of low sandy hills on the coast of North Holland, separates the hamlet of Camp from the German Ocean, and is celebrated as being adjacent to the scene of Admiral Duncan's engagement with the Dutch fleet under Admiral Van Winter in 1797. For the victory Duncan was created Viscount Duncan of Camperdown.

Camphenes are solid substances of composition $C_{10}H_{16}$. A number of different varieties are obtained from different turpentines, but all have composition given above, and closely resemble one another.

Camphor, (1) a group of pungent aromatic substances, stearoptenes of essential oils, which are tough, waxy, colourless, translucent, with a specific gravity nearly that of water, readily volatilising at moderate heat, slightly soluble in water, but completely so in alcohol or ether. They are closely related chemically to the turpentines, with which they frequently occur in plants, and from which they may be prepared. Most of the camphor of European commerce ($C_{10}H_{16}O$) is distilled as a crystalline sublimate from the wood of *Camphora officinarum*, a lauraceous tree found mainly in the island of Formosa. It is imported to the extent of some 700 tons annually, mainly from Singapore. Ngai camphor, the produce of *Blumea grandis* and *B. balsamifera*, natives of Tenasserim, is used in China in making ink. Borneo, Malay or Sumatra camphor, shipped from Barus, and hence known as Kapur Barus, sometimes also called Bamboo camphor from being packed in bamboos, is Borneol ($C_{10}H_{18}G$), the produce of *Dryobalanops aromatica*, and is so highly prized by the Chinese that it does not reach Europe. *Menthol*, or *Mentha Camphor*, $C_{10}H_{20}O$, occurs in oil of peppermint. It forms colourless crystals, with an odour resembling that of its source. Other varieties of camphors are found in different volatile oils, as the oils of absinthe, galbanum, cajuput, etc., all resembling ordinary camphor in most of their properties. Camphor is a popular preventive during epidemics, and is very useful in preserving clothes, furs, and natural history specimens generally, from moths and other insects.

The pharmacopœial preparations of this drug are aqua camphoræ, linimentum camphoræ, linimentum camphoræ compositum, spiritus camphoræ, and tinctura camphoræ composita (paregoric elixir). Camphor is also contained in several other liniments. Administered internally, camphor is a carminative, allaying spasm and relieving flatulence; it also promotes sweating, and, acting on the nervous system, produces in large doses a species of intoxication.

Campi, BERNARDINO, painter, was born in 1522 at Cremona. Studying first under his elder brother Giulio, he afterwards took Romano, Titian, and Correggio as models, without, however, sinking his own individuality. He also followed Raphael.

Campi, GIULIO, painter, eldest brother of the preceding, was born about 1500 in Cremona. He received his preliminary instructions from his father, and was afterwards taught by Giulio Romano, not in painting only, but also in sculpture and architecture. He acquired great skill in colouring. He died in 1572. Two other brothers, besides BERNARDINO, who acquired distinction as artists, were ANTONIO and VINCENZO.

Campinas, a city of Brazil, situated in a sugar-growing district, and 50 miles N. of São Paulo.

Campion, the English name for several meadow flowers, mostly species of the caryophyllaceous genera *Lychnis* and *Silene*, with rose-coloured or white flowers. *L. coronaria* and *L. Flos-Jovis*, common garden flowers, are called rose campions; *L. diurna* is the wild red campion; *L. vespertina*, the evening or white campion, sweet-scented at dusk; and *Silene inflata*, the bladder-campion, so named from its inflated calyx.

Campion, EDMOND, Jesuit, was born in 1540 in London. Educated at Christ's Hospital and at Oxford, he was admitted to holy orders, being ordained deacon in 1567. Subsequently, however, he became a Jesuit and attacked Protestantism, particularly in his *Decem Rationes*. In 1581 he was arrested and thrown into the Tower, being tried for high treason, and executed at Tyburn in the December of the same year. Amongst his writings was a *History of Ireland*, written in 1569.

Camp-meetings, meetings of a religious character held in various places, and continued sometimes for many days at a time, during which continuous devotional exercises are kept up. [REVIVALS.]

Campobasso, a city of South Italy, capital of the province of Campobasso, is situated on the slopes of the mountain Monteverde. It is famed for its cutlery, and has good trade. It has also a cathedral, some convents, and a ruined castle.

Campodea, a minute insect of the order THYSANURA; it is wingless, has only six openings to the breathing tubes (tracheæ), and is of especial interest from the possession of rudimentary limbs on the abdomen (compare this with the cercopoda of cockroaches). From this character, the complete absence of wings in all stages of development, and the general resemblance to the MYRIAPODA, Campodea is regarded as about the most primitive of living insects. Some higher forms pass in development through a stage resembling this genus; this is known as the "Campodeiform" stage.

Campo-Formio, a market town of North Italy, in the province of Udine, is situated on the canal of Roja. It is celebrated on account of the treaty of peace here signed between Austria and

France, October 17th, 1797. The leading feature in this treaty was that in return for the Belgian provinces and Lombardy, ceded to France by Austria, the latter should receive the Venetian states.

Campos, formerly SÃO SALVADOR DOS CAMPOS, a city of Brazil in the province of Rio Janeiro, is situated near the mouth of the Parahiba do Sul. It is surrounded by fertile plains, yielding sugar-cane, which produces the best sugar made in Brazil.

Camp Vere, a fortified seaport of the Netherlands, in the province of Zealand, is situated on the island of Walcheren. Formerly it was a place of considerable commercial importance, indications of which are still seen in its beautiful cathedral and town house. In Camp Vere the Scottish merchants had their staple, which was transferred thither from Bruges in 1444, *i.e.* all goods sent from Scotland to the Netherlands were deposited in that city, and there they remained until sold. These Scots formed a separate community in the city, and amongst the privileges they enjoyed was the right to be governed by the law of their own country.

Camus, ARMAND GASTON, was born in 1740 in Paris. By reason of his knowledge of ecclesiastical law he was chosen advocate-general of the French clergy. Subsequently, as a member of the states-general for Paris, he showed himself a determined opponent of the court party. He was amongst those that accused the king of treason and conspiracy, and being absent at the time of the king's trial, he sent his vote for execution. He was imprisoned in 1793 by the Austrians, and after two and half years was released in exchange for Louis XVI.'s daughter. Returning to Paris, he was made one of the Council of Five Hundred, and became president of that body in 1796. He shortly after resigned and devoted himself to literature. He died in 1804 of apoplexy.

Canaan, a name used in the Scriptures to designate the Promised Land of the Israelites. [PALESTINE.]

Canaanite, an inhabitant of the land of Canaan: the term included the Amorites, Hittites, Jebusites, and others, but the Phœnicians were the Canaanites proper.

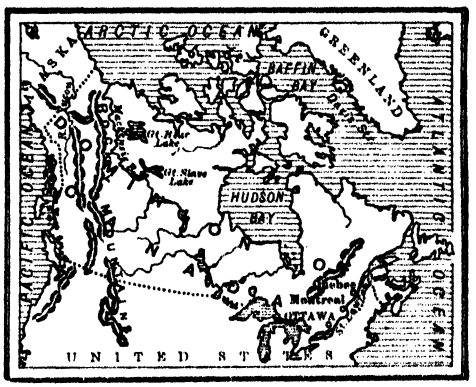
Cana of Galilee, a decayed town of Palestine, variously identified with Kefr Kenna and Kana-el-Jelil, is celebrated in Scripture as the scene of our Saviour's first miracle, where He turned water into wine, and as the birthplace of Nathanael.

Canada. The Dominion of Canada is a Federal Union, constituted by the "British North America Act, 1867," passed by the Imperial Parliament, and embodying a scheme devised by colonial statesmen as the result of conferences held during the two previous years. The plan was suggested by a proposed confederation of the maritime provinces. The Federation was proclaimed officially on July 1, 1867. The original members were Upper and Lower Canada (since called Ontario and Quebec), Nova Scotia, and New Brunswick. Provision was made for the admission of other provinces, and British Columbia and Prince Edward's Island were admitted in 1871 and 1873 respectively. The Hudson's Bay territories were purchased in 1869 from the Hudson's Bay Company. Manitoba (q.v.), formerly the Red River Settlement, was formed of part of this and admitted in 1870. Newfoundland has never joined the Confederation. The provinces of Alberta and Saskatchewan were formed from the provisional districts of Alberta, Athabaska, Assiniboia and Saskatchewan, and were admitted to the Union as provinces in 1905. The parliamentary system is similar in principle to that of the United Kingdom, the Crown being represented by a Governor-General, and the Dominion Legislature of two chambers. The Upper, or Senate, consists of eighty-seven members nominated for life; the qualification is the possession of property to the value of 4,000 dollars The Lower, or House of Commons, consists of 214 members, the representation of the province of Quebec being fixed at sixty-five members, while the rest of the Dominion is represented in the proportion of one member for every 25,367 inhabitants, in accordance with a redistribution bill passed in 1903. Except in the N.W. Territories, the franchise is based on a small property qualification, income from earnings being taken into account. The executive consists of the Governor-General and a cabinet or council of fourteen members. There is, of course, party government on the English system. Quebec and Nova Scotia have each two chambers, a Legislative Council and a Legislative Assembly, with a responsible ministry. New Brunswick, Ontario, Manitoba, British Columbia, Prince Edward Island, Alberta, and Saskatchewan have only one chamber. There are slight differences in the franchise in the different provinces. The extreme term of their parliaments is fixed at four years. Local legislation on most subjects belongs to them. There is also a very complete system of local government. The only Dominion courts are the Supreme Court, with a Chief Justice and five other judges, and a Court of Exchequer (for revenue cases), with one judge. The Supreme Court exercises appellate jurisdiction from the provincial courts, both civil and criminal.

Physical Features. The Dominion contains the whole of the North American continent north of the United States, with the exception of Alaska (q.v.). Its total area is about 3,500,000 square miles, or about half that of North America. The eastern coast-line is very deeply indented, Nova Scotia in particular being almost separated from the mainland by the Bay of Fundy with its prolongations, while Cape Breton and Prince Edward's Island lie close to its N. coast. There are also numerous small bays. The St. Lawrence is upwards of 30 miles wide at its mouth, and the coast of Labrador is also considerably indented. The extreme north of the continent is geographically a mass of islands scarcely explored, except as to their coast-line, and inhabited only by wandering Esquimaux. [NORTH-WEST PASSAGE.] The deep inlet of Hudson's Bay, and its prolongation, James's Bay, penetrate the land deeply, the latter to a point about 300 miles from Lake Superior, while the mouth of the Nelson river on the W. coast of the former is almost half-way between the Atlantic and

the Pacific, and only about 200 miles from the N. end of Lake Winnipeg. The distance between this point and Liverpool is less than that between Liverpool and New York. A railway connecting it with Winnipeg is contemplated, and hopes are entertained of opening up direct trade for four or five months in the year at some future date, but there is still some doubt as to the commercial value of the route, which was surveyed and favourably reported on by H.M.S. *Alert* in 1884. The Pacific coast-line is very deeply indented with winding fjords, resembling those of Norway, but on a far grander scale, and between higher mountains. Vancouver's Island at the extreme S., separated from the mainland by Queen Charlotte's Sound and the Strait of San Juan del Fuca, is by far the most important of the many islands which fringe the coast. The maritime provinces, with that part of Quebec which is S. of the St. Lawrence, may be described as a mass of hill ranges, the prolongation of the Appalachian chain. Mainly the land is forest, but occasionally there are fair stretches of arable and grazing land. The bulk of Ontario is greatly undulating, and usually fertile country, broken occasionally by abrupt terrace-like changes in level, one of which occasions Niagara Falls. Its N. boundary is the Laurentian Mountains, or (very roughly) a line drawn due W. from Quebec to Lake Huron. Its only mountains are a few isolated trap hills near Montreal. At the N.E. end of Lake Ontario it is encroached on by the rock-formations of the area north of it. This area is hilly, with so large a number of lakes and rivers that tolerably direct canoe communication is possible with only short portages between almost any two points in it, or by many routes between the St. Lawrence and the Arctic Ocean. The summits range from 1,000 to 2,000 ft. West of long. 96° W. there is a great prairie region, narrowing gradually towards the W., but 400 miles wide even at the Arctic Ocean, and extending to about 114° W. at the United States boundary. North of the Saskatchewan, however, this plain is covered by coniferous forest. This rises in three successive steppes towards the N.W.; terraces which mark their boundaries being survivals of the shores of a great lake or arm of the sea. The highest of these steppes is much cut up; the lowest, about Winnipeg, is described as a shallow trough, extending into Minnesota. West of this again are the Rocky Mountains. [BRITISH COLUMBIA.]

Lakes and Rivers. The St. Lawrence, with the lakes from Lake Superior onwards, may be regarded as a continuous stream 2,500 miles long. The St. Lawrence proper, beginning at the Thousand Islands (really about 2,000 in number) at the outlet of Lake Ontario, receives numerous tributaries, chief among them the Ottawa, 780 miles long; the St. Maurice, 300 miles long at Lake St. Peter near Quebec; and the Saguenay, which for 70 miles upward from its mouth at Tadousac is a mile wide, and runs between perpendicular cliffs 1,500 ft. high. The Red River, 600 miles long, rises in United States territory. The Assiniboine, its chief tributary, joins it 40 miles above Lake Winnipeg, the city of Winnipeg being at their junction. The Saskatchewan is formed by two great branches which rise a short distance apart in the Rocky Mountains, and, after numerous windings, meet 550 miles from their source, the river reaching Lake Winnipeg some 280 miles farther, and then falling into Hudson's Bay. Besides the great lakes on the course of the St. Lawrence, there are Lake Winnipeg, 300 miles long, Lake of the Woods, Rainy Lake, Lake Nepigon, and others between Lake Winnipeg and Superior. The lakes of Canada number thousands,



MAP OF CANADA.

chiefly in the region N. of the St. Lawrence. The Fraser, Columbia, and Peace rivers are the chief streams of British Columbia (q.v.).

Climate. Though Canada reaches as far south as the latitude of Rome, the influence of Arctic currents makes it far colder than Central Europe. The Pacific coast, indeed, owing to the warm Pacific winds, is 25 per cent. warmer than the Atlantic coast at the same latitude, and its climate is as mild as that of Southern England. At Esquimault the maximum temperature is 85° F., the minimum 48° F. The mean temperature of S. Manitoba is 60° F., with a warm, somewhat rainy, summer, and fine autumn. The minimum temperature in parts of N. Manitoba is 30° to 40° below zero F. At Toronto the maximum is 95° F., and the minimum 16° below zero F. At Montreal the minimum is about 6° below zero F. The great lakes, which are seldom frozen except near shore, considerably influence the climate. Its dryness (except in the maritime provinces) makes the extremes of heat and cold far more bearable than those of an English winter, and the brilliant sunshine, clear sky, and bracing air give a Canadian winter a special charm.

Population. The totals of the three last censuses were: 1881, 4,324,810; 1891, 4,833,239; and 1901, 5,371,315. The 1901 census showed an increase of a little over 10 per cent. over the last census, as compared with 11·74 per cent. of the previous decade. The increase occurs in the districts W. of Ontario. In 1881 there were 35 cities and towns of 5,000 inhabitants and upwards, in 1901 there were 55 of such cities and towns. The figures

indicate a movement to the rapidly growing towns. In 1901 four-fifths of the population were natives of British North America, and over 1,400,000 were French "habitants," *i.e.* French Canadians. More than two-thirds of the immigrants had come from the United Kingdom. In 1901 the leading cities were: Montreal, 267,730 inhabitants; Toronto, 208,040 inhabitants; Quebec, 68,840 inhabitants; St. John, 40,711 inhabitants; Halifax, 40,832 inhabitants; Winnipeg, 42,340 inhabitants. About 108,000 Indians in all are settled on reserves, and 6,000 Indian children are at school. Roughly, about a fourth of the Indians are W. of the Rocky Mountains. There has never been an Indian difficulty in Canada similar to those of the United States. The N.W. territories were duly bought by treaty, in exchange for allotments and an annual payment to each Indian concerned.

There is no state church in Canada, though in Quebec certain payments of church rates are compulsory for Roman Catholics. The Church of England has 19 bishops, 1,000 clergy, and about 680,000 members, and the Roman Catholic Church priests, and about 2,230,000 members; the Presbyterians number 842,000, the Methodists over 916,000 members. These numbers are those of the census of 1901.

Education was free and compulsory in the old province of Canada as early as 1846, and is now so throughout the Dominion. The schools are maintained by local rates and grants from the provincial and Dominion governments. Where necessary there are different state-aided schools for different religions. There are public higher grade schools with very low fees, and eleven universities and colleges, besides theological colleges.

The revenue of the Dominion in 1906–7 amounted to £16,695,700, and the expenditure to £14,008,470. More than half the revenue was derived from Custom duties. The total public debt (nett) 1906, was £79,159,755.

Defence. Halifax and Esquimalt are now garrisoned by Canadian troops. There is an active militia of 54,000 men. Under the Militia Act of 1904 all males (with few exceptions) between the ages of 18 and 60 are liable for service. There is also a small regular army of 3,068 men, comprising all arms, and a royal military college for cadets at Kingston. In the N.W. Territories there is a mounted police force of 50 officers and 1,000 men. The police elsewhere (except in a few ports) is under the municipal authority.

Railways. There are about 22,000 miles open, of which 13,347 miles belong to the Canadian Pacific, 3,570 to the Grand Trunk, 1,450 to the Intercolonial, and 2,438 to the Canadian Northern. The total capital is 1,332,498,705 dollars, of which nearly one-fourth has been contributed by the Dominion or by the various provincial and local governments. Over 32,000,000 passengers and over 63,000,000 tons of freight were carried in 1907. The Canadian Pacific railway main line from Montreal to Vancouver is 2,906 miles long. The Grand Trunk Pacific railway, which was approved by Parliament in 1904, will extend from Moncton, New Brunswick, to Kaien Island, on the Pacific coast.

Canals have been constructed to assist the exports of the St. Lawrence and the Ottawa, and from Lake Erie to Lake Ontario (the Welland canal) to avoid Niagara Falls. The lakes into which the St. Lawrence expands have also been sufficiently dredged to permit the largest ocean steamers to reach Montreal, and canals connect Lake Champlain with the St. Lawrence, and Kingston with Lake Ontario. Vessels of 1,500 tons can pass through the Welland canal. The dues are low, and everything is done to facilitate navigation and compete with the Erie Canal route to the Atlantic.

The shipping entered and cleared amounted to 22,780,458 tons in 1906.

The standard money is the dollar of 100 cents, the usual rate of exchange being 4s. per dollar. The par value of the sovereign is fixed by law at 4 dollars 86⅔ cents. American money circulates freely. There are private bank notes and small notes issued by the government. The weights and measures are those of England, except that the cwt. and ton are 100 and 2,000 lbs. respectively, as in the United States.

Mineral wealth. There are large deposits of coal in Nova Scotia and Cape Breton, some seams being 30 feet thick; on the coast of British Columbia, and in a region 150 to 200 miles broad, and running 1,000 miles N. and S. at the E. base of the Rocky Mountains. Lignite is also plentiful there. Gold is found in Nova Scotia, and in British Columbia, where large fields are yet unworked. Iron is found in many parts of the Dominion; some of its ores are among the best known. Copper is worked in Quebec and Ontario, and on the N. of Lake Superior; silver in Ontario; salt chiefly at Goderich, on Lake Huron; there are large petroleum wells in Ontario, and much is known to exist near the Rocky Mountains. Phosphate of lime, a valuable fertiliser, is found in quantities in the Ottawa Valley. Antimony (in New Brunswick), gypsum, asbestos, and nickel are also said to occur in large quantities. The mineral wealth of Canada, indeed, seems extraordinary, and as yet is comparatively little worked. There is a great variety of marble and building-stone.

Forests. Essentially the Dominion is a forest country, with the exception of the S. part of the prairie region of Manitoba and parts of Ontario. On the coast of Hudson Bay and Labrador the trees are chiefly conifers, with some white birch and poplar. In the interior are the "mixed forests" of some sixty or seventy kinds of trees, and forty or fifty of shrubs. Black walnut, butternut, button wood, the sugar maple of the St. Lawrence valley, chestnut, birch, dogwood, sassafras, huge oaks and elms, may be mentioned as prominent trees. With the sugar maple the wild vine is often associated. On the S. of Hudson Bay the Banksian pine reaches 100 feet in height. British Columbia has forests of the giant Douglas pine and red cedar, which are next in magnitude to the Wellingtonia or sequoia of California.

Fisheries. In 1906 the products *sold* were over 26,000,000 dollars in value, but almost every inhabitant is within reach of fishing of some sort, and

a large part of the produce is reserved for home consumption, which is roughly estimated at 13,000,000 dollars more. The principal fish caught are: Cod, value (in 1906) 3,471,186 dollars; herring 2,704,596 dollars; salmon, over 5,856,000 dollars; while the catch of whitefish, trout, and several other fish is in value half a million to a million of dollars each. The value of lobsters caught was about 3,422,000 dollars. The fisheries employ over 61,000 men, and the boats, nets, etc., represent a capital of about 4,500,000 dollars. Including weirs, etc., the total plant is valued at 6,800,000 dollars.

Animal Produce. In 1908 over 9,301,100 dollars' worth of live cattle were exported, £1,759,900 worth being sent to Great Britain. Over 1,196,000 dollars' worth of sheep were also exported in 1908. Dairy farming is extensively carried on, the farmers taking the milk to butter and cheese factories. The value of the cheese exported to the United Kingdom has risen from £2,382,265 in 1892 to more than £4,666,000 in 1908. Bee-keeping and poultry-raising are growing industries, and the latter has a great future before it.

The great feature of the *agriculture* is, of course, the wheat grown on the fertile prairies of the N.W. and in parts of Ontario. The grain is of the very highest quality, and the trade capable of indefinite development. Canadian oats, barley, and rye have no superiors. Indian corn, though far less grown in Canada than in the United States, is raised in Ontario, and though not a staple may become so. In 1908 wheat to the value of 40,004,723 dollars was exported by Canada, and wheat flour to the value of 8,454,950 dollars. The total of the agricultural produce exported in 1908 was 66,070,000 dollars.

Manufactures. The census of 1901 specifies agricultural implements, boots and shoes, furniture, distilling, engine-building, rolling-mills, oil refineries, paper making, sugar refining, shipbuilding, and food preserving as among the more important industries. Saw mills, flour mills, and tanneries head the list. Most of the other branches of manufacture have been stimulated, if not called into existence, by a policy of protection to native industry.

History. In 1534 Jacques Cartier sailed up the St. Lawrence, in 1540 he conducted 200 colonists to the country under Jacques de Roberval. Canada (the Indian word for huts) was assumed by the French to be the native name of the country. In 1603 Champlain made a permanent settlement on the St. Lawrence, and Quebec was founded; Montreal following shortly after. The new settlement was modelled on the French feudal system, there being seigneurs with special manorial rights, and tenants liable to military service. In 1625 a Jesuit mission was established, which carried Christianity across the continent and even to California. In 1662 the French Company, which had hitherto held the country, resigned its charter to the king; the colony made rapid progress, and that marked national feeling began which is still visible in Quebec. In 1757 the war just begun between England and France was carried into Canada. The English at first suffered severely, but Wolfe took Quebec in 1759, Montreal surrendered next year, and the English acquired Canada. It remained under military government till 1774, when, to gain the support of the French Canadians in the impending struggle with the American Colonists, the English permanently established the French land law and the Roman Catholic Church in the present province of Quebec. Canada was now governed from England, but when numerous loyalists migrated to what is now Ontario, after the American revolution, Upper Canada, west of the Ottawa river, was made a distinct province, Quebec being called Lower Canada. Each province had a distinct representative government on the English model, with the important exception that the ministry was responsible only to the Crown, and there was constant discontent and friction. In the war of 1812, however, the American troops were unable to gain Canada, but in 1837 discontent with English interference produced a rebellion. This was speedily suppressed, and Lord Durham, who was sent out as governor, advised the granting of self-government, which was done (though the proposal had excited much indignation in England) in 1840. Since then the country has been continuously tranquil and prosperous, though there have been long and bitter party conflicts. Much to advance Canada was done by Lord Elgin and under his governorship (1847–1854). The capital was moved to Ottawa in 1857. The Red River rebellion at Winnipeg (checked by Lord Wolseley) in 1869, the adoption of a "National Policy" (*see* below) by Sir John Macdonald in 1879, the Riel rebellion in Manitoba in 1886, the opening of the Pacific Railway, and the signing of the fisheries treaty (q.v.) in 1888, have been the leading events of recent history.

The Dominion, as a whole, is a remarkable instance of a national unity constituted by artificial means, in the face of great geographical difficulties, by a policy of lavish subsidies to railways, etc., and stimulation of industry by protective duties. Whether it can be lasting remains to be seen. This policy seemed to favour the growth of a considerable degree of corruption in the Civil Service and among public men, and a party in Canada strongly in favour of commercial (to be followed in time by political) union with the United States grew up. But the difficulties of this union are very considerable from the point of view of the United States politician, and there is a strong feeling in the Dominion of loyalty to the Crown.

Canada-balsam. [BALSAMS.]

Canada Goose. [BARNACLE GOOSE.]

Canadian River, a river of the United States, rises in New Mexico and flows eastwards through Texas and the Indian territory into the Arkansas river. The length of its course is estimated at 900 miles.

Canaletto, ANTONIO, painter, was born in 1697 at Venice, his real name being Canale. He studied at Rome, giving particular attention to the effects of light and shade, in which he became an

adept. His pictures of Venice are very famous. He was the first artist to use the camera obscura for perspective. He died in 1768, having won riches and renown.

Canaletto, BERNARDO BELLOTTO, nephew and pupil of the preceding, was born in 1724 at Venice. He, too, attained distinction in his art, his special strength lying in perspective and light and shade effects. He died in 1780 at Warsaw.

Canals are artificial channels cut in the ground, or built up above it, supplied with water from the sea, from rivers, or from springs, and forming waterways for inland navigation and goods traffic. They may also be employed to drain away the water from a district, or to supply water from a river to a region where it is scarce, and its want much felt for agricultural or other purposes.

Canals were known and appreciated by the ancients, both for navigation and irrigation. The Egyptians employed them extensively. Two still exist in Lincolnshire that were built by the Romans; and there are ancient canals in China where inclines were employed to transfer the boats from one cut to another at a different level, a method still used to solve the difficulty of traversing hilly country by a waterway. But it is only since the middle of the 18th century that canals have been taken up at all generally. Then Brindley designed and completed several in England, and canal schemes became popular. The introduction of railways considerably diminished the inland water traffic in this country. The largest canals in Great Britain are the Gloucester and Berkeley, 17 miles long and 15 feet deep, enabling vessels of 600 tons to reach Gloucester from Sharpness; the Aire and Calder Navigation, 9 feet deep; the Forth and Clyde, 10 feet deep; and the Caledonian Canal, 60 miles long, 120 feet wide at the surface, 50 feet wide at the bottom, and 17 feet deep, which, by uniting a chain of lakes in Inverness, forms a waterway across Scotland for vessels of 300 tons. In 1906 a Royal Commission was appointed to inquire into the canal and inland navigation. In 1908 it issued a Blue book giving details of all the canals in the kingdom.

In France there are 3,000 miles of canals and 2,000 miles of canalised rivers, forming the best canal system in Europe. The flatness of Holland and certain parts of Belgium have rendered their canal traffic very flourishing for several centuries. The Amsterdam trade has been much improved recently by the construction of the ship canal, 16½ miles long, between that town and the North Sea. It only involved the cutting of about three miles of canal, the rest being merely a channel dredged out of the Wyker Meer.

In Russia, the Volga and Neva canal connects those two rivers, and enables large vessels to pass from one to the other. A ship canal joins St. Petersburg with Cronstadt; its width is from 200 to 275 feet, and depth 22 feet; and it thus enables sea-going vessels to reach St. Petersburg, which the insufficient depth of the Gulf of Finland previously prevented.

In America the most important canals are the Erie, 370 miles long, joining the Hudson river to Lake Erie, for vessels of 250 tons; the Georgetown to Pittsburg, joining the Potomac with the Ohio, would be about the same length if completed, but not quite 200 miles have as yet been cut; the St. Lawrence system enables vessels of from 1,000 to 1,500 tons to pass between Lake Erie and Montreal, the Welland canal connecting Lakes Erie and Ontario so as to avoid the Niagara river.

The *Suez Canal*, joining the Mediterranean with the Gulf of Suez, is of enormous importance, saving, as it does, the great *détour* round the Cape of Good Hope for vessels travelling between Europe and Australia or the south of Asia. It was begun in 1860 and finished in 1869 by M. de Lesseps, the French engineer, at a cost of £16,000,000. Its length is about 100 miles, bottom width 72 feet, surface width varying from 200 to 330 feet, and depth 26 feet. A service canal was cut for part of the way during the process of construction; and a fresh-water canal from the Nile to Suez was also formed, in order to give a supply to the waterless regions through which the works had to be conducted. The traffic has increased so enormously on the Suez Canal that its bottom width is being increased, and the channel deepened to 31 feet.

The *Panama Canal*, as originally proposed by M. de Lesseps, was to join the Atlantic and Pacific Oceans by cutting across the Isthmus of Panama at its narrowest part, between Aspinwall and Panama. It was to be level throughout, traversing a range of hills by a cutting 300 feet deep at one part. This was commenced in 1882, but the difficulties in the work and the want of funds caused a change in the design, the plan of a locked canal being adopted to diminish the amount of cutting required. Natural difficulties of an exceedingly serious nature, which do not seem to have been foreseen by the engineer, put back the work continually, and in 1889 the company became insolvent. A French syndicate then assumed charge of the property and continued the works. In 1904 the whole property was purchased by the United States for 40,000,000 dollars. In 1906 a lock canal was definitely decided upon, with six locks. Its total length will be about 46 miles. The canal is to be neutral, and open to the world's commerce.

An American scheme for forming a waterway across Nicaragua, by canalising the San Juan emissary of Lake Nicaragua, was passed by the Senate and House in 1889. The proposed canal route was to be 170 miles long, with three locks on each side of the lake, the minimum depth to be 30 feet. Its construction was commenced, but the work was abandoned in 1891.

The *Manchester Ship Canal* allows large vessels to pass up from the Mersey to Manchester. It starts from the south side of the Mersey estuary at Eastham, runs near the shore to Runcorn, and then inland to Manchester, near the course of the Irwell. It is 35 miles long, with bottom width 120 feet and depth 26 feet. There are sets of locks at three different places, each set being arranged to accommodate vessels of different sizes. The docks at Manchester are 88 acres in extent. The work was completed in 1893, and the canal opened on 1st of January 1894.

The *Kiel Canal*, to join the Baltic with the North Sea, was opened by the German Emperor in 1895. It was designed for the largest vessels, especially German warships. The canal is 61 miles long, 28 feet deep, and 61 yards wide at the surface. Through the increased size of battleships, it was decided in 1907 to enlarge the canal.

Drainage and irrigation canals are intended to lead water along from one place to another, and are therefore to be designed with a regular slope in the bed. If the slope is too slight, the current is not rapid enough to conduct the necessary amount of water without unduly increasing the sectional area of the canal; if too great, the rapid current induced will damage the canal bed. In this respect of slope such canals differ from navigation canals, which are laid in level reaches, and therefore require special means to conduct vessels from one reach to another at a different level. This transference is generally done by *locks* (q.v.). A lock is an enclosed space between two watertight gates that separate the two reaches of the canal. A boat passing from the lower level to the higher is first floated into the lock, from which water had been allowed to flow till the level was that of the lower reach. The upper gate is closed, and has to withstand the pressure of the water on its outside face. Then the lower gate is closed, and water from the higher level is allowed to enter gradually till the lock-level and that of the upper reach are the same. The upper gate is then opened, and the boat floated out.

If the difference in level is very great a series of locks may be employed, or a carriage may convey the vessel bodily up an *incline* from the one reach to the other, the carriage being drawn by a cable that is partially hauled by a descending load. The vessel may be taken out of the water, or it may be contained in a large tank or caisson. Hydraulic lifts are now much employed to effect the same result of changing levels.

The depth of a canal should be 1½ feet greater than the draught of the vessel on it; its bottom width should be twice the breadth of beam; and the sides should slope from 1½ to 2½ feet per foot, though special circumstances may modify this rule considerably.

By the statute 8 and 9 Vic. c. 42, canal companies were entitled to become carriers on their canals; also to lease the same or to take leases of other canals, and by subsequent Acts the traffic and tolls over canals are regulated. Subject to the payment of tolls and the traffic rules, the public have a right of using the canal, and a canal company cannot confer an exclusive right to let boats for hire over their water so as to give the guarantee a right to sue a third party for the infringement of this right.

An Act of 40 and 41 Vic. c. 60 regulates the use and registration of canal boats as dwellings.

Canary, properly the Canary-bird, a very common cage-bird, with great power of song. The original stock is a greenish-olive siskin-like finch (*Serinus canaria*), a native of the Canary Isles. This species, numbers of which were brought to Europe some 300 years ago, has the general habits of a finch, is a poor songster, and, like its European congener, the Serin (q.v.), prefers to build in the neighbourhood of farms and houses. It produces from two to four broods in the year, a practice continued by the domestic race. The brilliant coloration is due to careful selection in breeding, as is also the great variety of form. Ten well-marked varieties are recognised—the Norwich, the Cinnamon, the London Fancy, the Lizard, the Belgian, the Scotch Fancy, the Yorkshire, the Crested, the Green, and the German—and each of these varieties runs into several classes. Canaries are extensively bred for sale in the city of Norwich, in the midlands, and in Lancashire and Yorkshire; but Germany is probably the chief seat of this industry, and the best songsters are undoubtedly trained there. Some of these birds have a compass of four octaves, and will execute various shakes in perfect style. A few have been taught to articulate words; one of the best authenticated cases is recorded in the *Proceedings* of the Zoological Society, 1858 (p. 231). Canaries breed readily in confinement, and produce hybrids freely with other finches.

Canary Creeper, the common name of *Tropæolum aduncum*, often wrongly called *Tropæolum canariense*, from its bird-like canary-yellow flowers. Like all the species of the genus, it is a native of South America, and has nothing to do with the Canary Islands. Its specific name *aduncum* refers to its method of climbing by twisting its leaf-stalks round any support.

Canary Islands, or CANARIES, a group of islands in the Atlantic, are situated about 60 miles from the N.W. coast of Africa, between lat. 27° 40′ and 29° 25′ N., and longitude 13° 25′ and 18° 16′ W. They number thirteen in all, seven of which are of considerable size, the remainder being mere islets, and cover a total area of nearly 3,000 square miles. The chief are Lanzarote, Fuerteventura, Gran Canaria, Teneriffe, Gomera, Palma, and Ferro or Hierro. They are all volcanic, rugged, and mountainous, the highest peak being Teneriffe, 12,182 ft. The climate is very fine and the soil fertile, circumstances that earned them the ancient name of *Fortunatæ Insulæ*—"Fortunate Islands." Among their products are the sugar-cane, bananas, dates, and on the more elevated tracts the ordinary grain crops of agriculture. Among the exports are cochineal, wine, and raw silk. The capital is Santa Cruz. From about the end of the 15th century these islands have belonged to Spain, who conquered and extirpated the Guanches, the original inhabitants. [TENERIFFE, GRAN CANARIA, PALMA, LANZAROTE, FUERTEVENTURA, GOMERA, HIERRO.] When first discovered, the Canary Islands were found to be inhabited by the so-called *Guanches*, an indigenous people, who are now known to have been a branch of the Berber race, but who had been so long isolated in the Archipelago that they had lost all memory of their Hamitic ancestry. From remote times a tribe of Canarii, the Kamnurieh of Arab writers, occupied the opposite mainland, and from them the name

passed to the island of Gran Canaria, and thence to the whole group and its inhabitants. These appear to have been a numerous and warlike people, who offered a stout resistance to the Spaniards, but were nearly exterminated in the war of conquest, which lasted ten years, from 1485 to 1495. They are spoken of as a people of fair type, with long, light hair falling down to the waist, of average height, very frank, truthful, and intelligent. They possessed a considerable degree of social culture, as shown by their solid stone houses, well timbered and plastered, their carefully cultivated orchards, kitchen gardens and corn fields, their curious stone sculptures of men and animals, and the universal custom of embalming the dead by the Egyptian process, and depositing them in vast crypts or underground cemeteries. Over 1,000 such mummies were found in a single cave in Teneriffe. A few of these aborigines are supposed still to survive amongst the rural populations of some of the upland valleys. From a comparative study of the little that remains of their language, their nearest kindred on the mainland appear to be the Shluhs (Berbers) of the Atlas Mountains, Morocco. Nevertheless, the researches of Dr. Verneau in 1877 seem to show that there were several distinct groups, such as those of Fuerteventura and Gran Canaria, and of Hierro, both of whom possessed a knowledge of letters, besides the less civilised natives of Teneriffe and Gomera, the Vincheni, or true Guanchos. (*See* Don J. J. da Costa de Macedo, "Ethnographical Remarks" in the *Journal* of the Royal Geographical Society, 1841, pp. 171–183, and Dr. Verneau, "De la Pluralité des races anciennes de l'archipel canarien" in *Bulletin* de la Société d'Anthropologie, 1878–1879.)

Canary Wine, a kind of sweet wine (once also called *sack*), made in the Canary Islands.

Cancan, (French) a low kind of dance.

Cancellation is the recission or abrogation of a contract or engagement—there must be an intention to do so to constitute cancellation. Bonds and deeds are cancelled by tearing off the seals, but the cancellation does not extend to divesting any estate or interest which has already become created under the deed.

Cancer. [Crab.]

Cancer, derived from the Latin word *cancer*, a crab, is the name applied to a particular kind of tumour or "new growth" affecting man and some of the lower animals. Tumours may be divided into two groups, innocent or benign, and malignant tumours; the latter being characterised by their rapid growth, infiltration of surrounding parts, and tendency, in some cases, to produce secondary or metastatic growths in distant organs. The term cancer was at one time generally applied to the whole malignant group of tumours; but the study of microscopical appearances has led to their division into two great classes:—*Sarcomata*, or tumours of connective-tissue origin, and *Carcinomata*, or true cancers, which are derived from *epithelium*. In the language of embryology *sarcomata* take origin from the mesoblast, *carcinomata* from the epiblast or hypoblast. [Blastoderm.] A *carcinoma*, or true cancer, then, is a growth caused by epithelial multiplication, and possessing the power of growing indefinitely and of infiltrating surrounding tissues.

The annual death-rate from "cancer" is ·5 per 1,000 living in England and Wales, the total death-rate from all causes amounting to about 20 per 1,000. So that about one death in every forty is due to cancer. Towards the end of the nineteenth century a great deal of attention was directed to the increase in the death-rate from cancer. Thus, for instance, for the years 1861–65 the rate was ·37; for the years 1881–85 the death-rate had increased to ·54. This increase was, at all events to some extent, an apparent, and not a real, increase, and due to the fact that the progress of knowledge has led to better diagnosis, and to the recording of deaths as due to cancer which would in former times have been attributed, from ignorance of their real nature, to other causes.

Cancer is a much more fatal disease in females than in males (in the proportion of about 2 to 1). This is in accordance with the fact that the two most common situations of malignant growth are the female breast and the womb. It is a disease of late life, being very uncommon before thirty-five years of age. Most of the deaths recorded as due to cancer in young people, in the registrar-general's returns, are cases of sarcoma and not of true cancer.

Carcinoma is divided into four varieties known as *scirrhus*, *colloid*, *encephaloid*, and *epithelial cancer*, or *epithelioma;* to which is sometimes added *adenoid*, or glandular cancer, this last-named variety being, however, sometimes considered as a sub-variety of *epithelioma*, and known as cylindrical *epithelioma*.

Scirrhus, or *hard cancer*, is most commonly met with in the female breast and affecting the pyloric end of the stomach or other parts of the alimentary canal. In *scirrhus* of the breast a hard nodule forms and often gives rise to shooting pains; it gradually increases in size, the skin becomes adherent over it, and retraction of the nipple occurs: before long the axillary glands become affected.

Microscopic examination of such a tumour shows it to be composed of a fibrous stroma infiltrated with epithelial cells. These cells occur in groups, enclosed in the bundles of fibrous tissue, forming alveoli. The epithelial growth, at first luxuriant, soon ceases at the centre of the tumour, and the fibrous tissue undergoes contraction; the cell infiltration continues to extend, however, externally, so that while the tumour increases in size at its periphery the inner portions become dense and indurated, resembling the tissue of a cicatrix or scar. The early diagnosis and removal of such a tumour is not infrequently followed by complete recovery; if, however, the growth has been present for some time, and particularly if the glands of the armpit have become involved, an operation is too apt to be followed by "recurrence."

Encephaloid cancer differs from scirrhus in its more rapid growth, associated with which is a

softer consistence and a deficiency of stroma, and consequent absence of the cicatricial contraction which is so marked a feature in the slow-growing scirrhus. The name encephaloid is derived from the soft brain-like appearance which this form of cancer presents. Encephaloid is rare, save when it occurs in internal organs (*e.g.* the liver) as a "secondary" growth.

Colloid cancer is really a variety of one of the already mentioned forms, in which a gelatinous or colloid degeneration has occurred.

Epithelioma involves the surface of the skin or of a mucous membrane, and particularly affects the junction between mucous and cutaneous surfaces. Again, places where complex changes occur in the process of development are apt to be involved, and hence it has been supposed by Cohnheim that the new growth is connected with the existence of embryonic rudiments, the growth of which is arrested for a time but subsequently springs into activity. Again, epithelioma is peculiarly associated with chronic irritation or injury. The epithelial cells are of the flattened, scale-like type, they extend downwards from the surface into the connective tissue beneath, and on microscopic examination characteristic globular aggregations of cells, like the coats of an onion, known as "cell nests," are often seen.

An epithelioma usually first appears as a small ulcer with irregular surface and indurated borders. The ulcer increases rapidly in size, the discharge from it being very offensive. The lower lip, tongue, cervix uteri, and œsophagus are common situations to be affected by the disease.

The cause of cancer is involved in obscurity. It often presents itself in patients who give a "family history" of the disease; its geographical distribution throughout England and Wales is peculiar; the association of malignant new growth with chronic irritation must be something more than a mere coincidence. The age distribution has already been alluded to, and Cohnheim's view has been mentioned.

Modern investigation is being mainly conducted with a view to demonstrating the parasitic nature of the disease. Attempts have been made of late years to connect cancer with a low form of animal life allied to the *Coccidium oviforme*, a parasite commonly found in the liver of the rabbit (in the encysted form known as *Psorospermiæ*). There is some reason for entertaining the hope that the time is not far distant when more may be known with respect to the causation of cancer, and if the essential nature of the disease be discovered much light may be thrown on means of preventing and possibly of curing it. Surgical operation, to be effectual, must be resorted to early. If the morbid process has been allowed to spread at all widely, and particularly if the neighbouring lymphatic glands have become involved, it is but too likely that the disease cannot be completely removed, and that it will recur after operation. Hence the paramount importance of early diagnosis. In many cases of superficial cancer, radium (q.v.) has been used with excellent results. Of the effects of this mode of treatment in less accessible forms of cancer it is too soon to speak, but there is ground for hoping that a wide field of usefulness lies before it.

Many forms of disease simulate cancer, and if the medical man is called in, it will in many cases be his pleasant duty to allay the apprehensions of his patient, but on no account should anyone who has the merest suspicion of cancer omit to at once obtain skilled advice.

Cancer curers have imposed upon the credulous from time immemorial. Some of them may work but little direct harm; others are actively injurious; all are alike productive of mischief if they delay for a time the obtaining of competent professional advice. In 1902, the Imperial Cancer Research Fund, of which King George V. is President, was started to promote investigations on the causes, prevention, and treatment of the disease, and has considerably furthered experimental research in regard to cancer.

Cancrum oris, or NOMA, is an affection of rare occurrence. It is met with in ill-nourished children, usually as a sequela of measles. The site of the disease is generally the cheek; in some instances the floor of the mouth or the gums are primarily involved. Soreness of the mouth, aggravated by the attempt to chew the food, and fœtor of the breath, are usually the earliest symptoms; or the first thing noticed may be a swelling in one cheek, and on examination of the interior of the mouth a sloughing ulcer is discovered, and the neighbouring lymphatic glands are found to be enlarged. The gangrenous process rapidly extends, the discharge is exceedingly offensive, and the soft tissues are rapidly eaten away, and teeth may be loosened and the bone be exposed. In severe cases death may occur. In milder forms of the disease the patient escapes with more or less deformity as the result of cicatricial contraction. Treatment is directed to removing the bad hygienic surroundings usually associated with the disease, to supporting the patient's strength, to the application of antiseptics, and, if necessary, of lunar caustic, or even of nitric acid to the surface of the ulcer.

Candelabrum, a candlestick or lamp-stand. Among the ancient Greeks and Romans much ingenuity was displayed in the ornamentation.

Candia, a large town in Crete (q.v.), and once the name by which the island itself was known in Western Europe. It is situated near the centre of the N. coast. Its chief industry is the manufacture of soap. The Greek Metropolitan of the island resides at Candia.

Candle Fish (*Thaleichthys pacificus*), a fish so closely allied to the Smelt (q.v.) as to be sometimes placed in the same genus with the name *Osmerus thaleichthys*. It is a native of the American side of the Pacific, and is so exceedingly fat that, according to Günther, "it is equally used as food and as candle."

Candle Flies, a group of species of RHYNCHOTA (q.v.) belonging to the genera *Fulgora* and *Hotinus*. They occur in America and China; they are large, and brightly coloured, and it is to the latter fact

that they owe their popular name. It is doubtful whether any of them are normally luminous.

Candlemas, a feast in commemoration of the purification of the Virgin, celebrated on February 2nd. It derives its name from the custom of holding processions and shows of candles. On this day in the Roman Catholic Church all the candles for the ensuing year are consecrated.

Candle-nut, the seed of *Aleurites triloba*, a tropical Euphorbiaceous tree, originally native to the Moluccas and the South Pacific. The fruit is fleshy and two-chambered, each chamber containing one nut. The nut contains a large proportion of a palatable drying oil known as kekune oil in Ceylon, as kukui oil in the Sandwich Islands, and as country-walnut oil in commerce. It is exported as lamp oil from the Sandwich Islands to San Francisco, and is said to be equal to colza. The dried kernels strung on reeds are used as candles by the Polynesians.

Candle-power is the measure of the luminosity of a source of light by comparison with a definite official unit known as the *standard candle*. This unit of light is supposed to be produced by a candle one-sixth of a pound in weight, and made to burn 120 grains of spermaceti wax per hour. The length of such a candle is from 8¼ to 9 inches, varying slightly with different makers; its diameter is from ·8 to ·9 of an inch. Unfortunately spermaceti is not a definite chemical compound, and its composition varies. The Acts of Parliament relating to the subject do not define this, nor do they specify the number and size of the threads in the wick. On these and other accounts the standard candle is not a fixed unit, a difference of as much as 25 per cent. being observable in the light of two specimens. The French official standard is the *carcel*, which is a hollow-wick lamp burning purified colza oil, and giving a light of about 9·5 candles. [PHOTOMETRY, LIGHT, LAMPS.]

Candles may be defined as rods of fatty or waxy materials surrounding a central wick, and designed for purposes of illumination. The simplest form of candle was the "rushlight," made by simply dipping the pith of rushes into ordinary bacon or other fat melted in an iron pot. The process of manufacture is now considerably more complicated, and varies for the different kinds of candles. The chief substances employed for the manufacture are tallow, stearin, paraffin, ozokerit, or wax. The process of moulding is now largely mechanical, machines capable of turning out 100 candles at one operation being used. The body of the ordinary candle usually consists of glycerin, $C_3H_8O_3$, in combination with various fatty acids, as stearic, palmitic, etc., and it has been found that better candles are obtained if instead of the fat the acid itself is used. This is done by suitable chemical operations, and stearin and composite candles are so obtained. The paraffin is a mixture of hydrocarbons, and is obtained by distillation of bituminous shale, petroleum, and mineral oils. Ozokerit is found native in Bohemia and Galicia. Wax candles cannot, like the above, be manufactured by casting in moulds, as the wax shrinks on cooling. They are generally made either by squeezing through a cylindrical mould, or by pouring the melted wax on the wick, and then working into a cylindrical form on smooth wood or marble. Beeswax or Chinese wax bleached by exposure or by the action of chromic acid is generally used. The wick is usually made of cotton yarn. In the burning of a candle the upper portion of the wax or tallow melts and runs up the wick [CAPILLARITY], and is there by the heat decomposed into combustible gases which burn round the wick.

Candlish, ROBERT SMITH, divine, was born in 1806 at Edinburgh. In 1828 he was licensed to preach, and in 1834 was chosen minister of St. George's, Edinburgh. He took a leading part in the disruption movement of 1843, being second in importance only to Dr. Chalmers, after whose death he became the ruling spirit in the Free Church. He was an eloquent preacher, and wrote a number of religious works. Among these were: *The Atonement, its Reality and Extent; An Examination of Mr. Maurice's Theological Essays;* and *The Fatherhood of God.* He died in 1873.

Candytuft. [IBERIS.]

Cane, the common name for the stems of various grasses and palms, especially bamboos (q.v.) and species of *Calamus* (q.v.), the latter including the rattans and Malacca canes. [SUGAR CANE.]

Canea, the capital of the island of Crete, is situated on the N. coast and occupies the site of the ancient Cydonia. The articles traded in are oil, soap, wax, wool, fruits, and silks.

Cane Sugar. [SUGAR.]

Canicatti, a town of Sicily in the province of Girgenti, is situated on the Naro. Agriculture is the leading pursuit.

Canker, a disease of the horse's foot.

Canna, a genus of *Marantaceæ*, with edible rhizomes, ornamental foliage, the leaves being strikingly convolute, and showy yellow, orange or red flowers. The perianth, five of the six stamens, and the style are petaloid, and the capsule contains numerous round, hard, black seeds, whence the name Indian shot is sometimes applied to these plants. The starch-grains in the rhizomes are the largest known. *Tous-les-mois*, originally Touloula, is the starch of a variety of *C. Indica* grown in St. Kitt's, and is a substitute for arrowroot, whilst a turmeric is obtained from another species at Sierra Leone. Cannas are much planted as "foliage-plants."

Cannæ, an ancient town of Italy in the province of Apulia, famous as the scene of the great battle in the summer of 216 B.C., between Hannibal and the Romans, when the former, with 50,000 men, defeated the latter, though numbering 86,000, with great slaughter.

Cannanore, a seaport of Hindustan in the Malabar district, Madras Presidency, and an important British military station. It has several mosques.

Cannel Coal, a hard black variety of coal (q.v.), containing about 95 per cent. carbon, and yielding by distillation a gas of high illuminating power.

Cannes, a French watering-place in the department of Alpes-Maritimes, is situated on the Mediterranean shore. As a health resort it was first selected by Lord Brougham. It was here, too, that Napoleon landed, March 1, 1815, on his return from Elba. It does a considerable trade in flowers, the produce of the surrounding country. The Duke of Albany died here in 1884, and the Albany Memorial Church of St. George of England was erected in his memory.

Canni, a town of Sicily in the province of Palermo, is situated on a small stream of the same name. It has the ruins of an old Gothic castle, and its inhabitants are chiefly engaged in fishing. In the neighbourhood are the ruins of Hyccara, the birthplace of Lais.

Cannibalism, the use by man of the flesh of his fellows for food. The word is derived from the Spanish *canibal*, a corruption of *caribal* = a native of the Caribbean Islands, with which the Spanish *canino* = dog-like, voracious, has been confused, so that a term of quite different signification has been formed from the native West Indian *carib*, which really means "brave." The equivalent term *anthropophagy* is of classic origin.

It is impossible to say how or when the practice originated; but the first act of cannibalism probably took place at some long period after man's appearance on this globe, for it seems pretty clearly established that the diet of the primeval race was frugivorous. In the present day cannibalism is confined to Africa, New Guinea, and some few islands of the South Pacific; but it is safe to assert that it has been practised by nearly every people at some period or other of its history. In classic mythology we find traces of it in the stories of the Cyclops and Laestrygons, and of Lycaon and Thyestes. In Herodotus we get a circumstantial account of the cannibalism of the Massagetæ (i. 226), and of the Issedones (iv. 26). In both cases it was of the nature of a funeral feast, and in the latter instance seems to have been prompted by filial piety, as the extract shows:—"As often as any one loses his father, his relations severally provide some cattle; these they kill, and having cut them in pieces, they dismember also the body of the deceased, and, mixing the whole together, feast upon it." Juvenal (xv. 12, 13) charges some of the Egyptians with the practice in time of scarcity, though they refrained from slaughtering their sacred animals for food; and St. Jerome credits the "Scots" (*i.e.* the Irish) with a liking for what they considered the choicer portions, though it must be added that the reading is disputed. Folk-tales also bear testimony to the former prevalence of the custom; and as a case in point one need only refer to *Jack the Giant Killer*.

Endophagy and *Exophagy* are, so to speak, refinements of cannibalism; where the former prevails only members of the tribe are eaten; where the latter is practised, only strangers are devoured. [Totemism.] Among races of low culture the practice was at first probably due to the *pressure of hunger*, which in shipwrecks and sieges has forced even civilised man to subsist on the flesh of his fellows; indeed, so lately as 1884 English sailors warded off starvation thus. Darwin (*Voyage of the Beagle*, ch. x.) tells how the Fuegians, when pressed by hunger, used to kill and devour their old women before they killed their dogs, and that one of them justified this on the ground that the old women could not catch others, while the dogs could.

From what may be called *occasional cannibalism* the transition to *habitual cannibalism* (see below) is easy, possibly on account of the facility with which the unnatural food can be procured. Another motive among savage tribes is *fury* or *revenge*, and in such cases it is chiefly a captured enemy, or one slain in battle, who is the victim. This motive, however, is almost inseparably mixed up with *magic* and *religion*, which among barbarous races insensibly grade into each other. Where magic prompts the practice the cannibal hopes to acquire the characteristic qualities of the victim on whom he feeds, and often chooses the heart with the idea of obtaining increased courage (Tylor, *Early History of Mankind*, p. 131). Cannibalism from religious motives is so interwoven with the doctrine of sacrifice that the subject will be better discussed under that head. Habitual cannibalism—fortunately confined to Equatorial Africa, where among some tribes shambles exist for the sale of human flesh—is thus accounted for by Winwood Reade (*Savage Africa*, ch. xiv.):—"A cannibal is not necessarily ferocious. He eats his fellow-creatures, not because he hates them, but because he likes them. A *craving for meat* to which the natives of these parts are subject, and for which in all their dialects there is a special term, may first have suggested the idea; but I am rather inclined to believe that it is a practical extension of the sacrificial ceremony." One cannibal whom Reade questioned as to the taste of human flesh said that it was "like monkey, all fat;" and this perhaps accounts for, Johnston's satirical remark on the fondness of the natives for the flesh of the baboon—"Doubtless the great resemblance to human flesh is *not* held as a drawback" (*Kilimanjaro Expedition*, p. 352), and his own feeding on monkeys in order "in this lawful way to form some idea of the practice of cannibalism."

Canning, The Rt. Hon. Charles John, Viscount, was born in 1812, third son of George Canning. After a few months in the House of Commons as Conservative member for Warwick, he was removed to the Upper House through the death of his mother, his two elder brothers having already died. In 1841 he accepted the post of Under-Secretary for Foreign Affairs in the ministry of Sir Robert Peel, becoming afterwards Chief Commissioner of Woods and Forests with a seat in the Cabinet, and Postmaster-General under Lords Aberdeen and Palmerston. In 1856 he succeeded Lord Dalhousie as Governor-General of India, thus holding that position in the difficult times of the Mutiny. In 1862 he returned to England seriously impaired in health and was created a K.G., having been raised to the rank of Earl in 1859. Two

months after landing, however, he died, and was buried in Westminster Abbey near his father. He left no children and the title became extinct.

Canning, ELIZABETH, was born in 1734. A domestic, she in 1753 disappeared, turning up again four weeks later in a hungry and half-clothed condition. Her story was that while on her way home from a visit she had been seized by two men, carried to an isolated house on the Hertfordshire Road, and subjected to ill-usage by an old woman to drive her to an immoral life. In two women, Susannah Wells and Mary Squires, she identified her persecutors, who were sentenced—Wells to be burnt in the hand, and Squires to be hanged. Dissatisfied with the evidence, however, the Lord Mayor had the case gone into again, with the result that Squires was pardoned, and Canning was put on her trial for perjury. The result was that she was transported for seven years, and being sent to New England died in Connecticut in 1773.

Canning, RIGHT HON. GEORGE, statesman, was born in 1770 in London. His father was the disinherited son of an Irish country gentleman, and, coming to London in 1757, settled down to a literary career, dying a year after the birth of his only son. George was adopted by his uncle, Mr. Stratford Canning, a city banker, and father of Lord Stratford de Redcliffe, and was educated at Eton and Oxford. In 1793 he was returned to Parliament for Newport, Isle of Wight, as a supporter of Pitt, and in 1796 became Under-Secretary of State for Foreign Affairs, projecting in the following year *The Anti-Jacobin*, ever remembered on account of Canning's *Needy Knife Grinder*, a satirical poem in which he ridiculed the "New Philosophy," promulgated by the French Republicans. In 1800 he married Miss Joanna Scott, sister to the Duchess of Portland, and herself a lady of fortune. In 1807 he became Secretary of State for Foreign Affairs in the Portland ministry. Through some misunderstanding he engaged in a duel with Lord Castlereagh, the Secretary for War, and was wounded, the quarrel leading to his withdrawal from the government. In 1822 the suicide of Lord Castlereagh enabled Canning to resume office, and he again became Foreign Minister and leader of the House of Commons. He is regarded as the greatest Foreign Minister England has yet had since Chatham. In 1827 he became Prime Minister, but his health broke down, and on August 8th he died. He was buried near Pitt in Westminster Abbey. Canning holds a high place amongst orators.

Cannock, a town of England, in the county of Staffordshire, is the centre of industries in iron, and has coal mines. Near it is Cannock Chase. Pop. (1901), 23,992.

Cannon, a great gun or field-piece, as distinguished from a small-arm. Cannon were first used in England about the year 1335, and were then usually made barrel-wise, and composed of iron bars hooped together with heavy iron rings. They were afterwards made of cast iron or brass, and cast steel or gun-metal; and are now, as regards the heavier calibres, generally built up of successive tubes, coils and jackets of steel. Edward III. used cannon at the battle of Cressy, and Henry of Castile also used them in 1372 in his naval engagement with the English off La Rochelle. Breech-loading cannon seem to have been known from very early ages; but not until after 1860 did they come into common use for naval and military purposes. According to Sir William Monson, who served against the Spanish Armada, the chief cannon of Queen Elizabeth's day were:—

Name.	Bore.	Weight of Shot.
	inches.	lb.
Cannon	8	60
Demi-Cannon	6⅞	33½
Cannon-Petro	6	24½
Culverin	5½	17½
Demi-Culverin	4	9½
Falcon	2½	2
Falconet	2	1½
Minion	3½	4
Saker	3½	5½
Rabinet	1	¾

By the end of the eighteenth century the following weapons, besides carronades (q.v.), were in use on shipboard. The guns in use about the time of Trafalgar were:—

Pounders.	Length.		Weight.			Calibre.	Powder Chrg.	
	ft.	in.	cwt.	qrs.	lb.	inches.	lb.	oz.
42	9	6	62	1	0	7·0	13	0
32	9	6	55	2	0	6·4	10	10
24	9	6	50	2	0	5·8	8	0
24	9	0	47	3	0	5·8	8	0
18	9	0	42	2	0	5·8	6	0
18	8	0	37	3	0	5.3	6	0
12	9	0	34	3	0	4·7	4	0
12	8	6	33	1	0	4·7	4	0
12	7	6	29	1	0	4·7	4	0
12	7	0	21	0	0	4·7	4	0
9	9	0	31	0	0	4·2	3	0
9	8	6	29	2	0	4·2	3	0
9	7	6	26	2	0	4·2	3	0
9	7	0	25	1	0	4·2	3	0
6	8	6	22	1	0	3·7	2	0
6	8	0	21	2	0	3·7	2	0
6	7	6	20	1	0	3·7	2	0
6	7	0	19	1	0	3·7	2	0
6	6	6	18	2	0	3·7	2	0
6	6	0	17	2	0	3·7	2	0
4	5	6	11	3	0	3·2	1	5
3	4	6	7	1	0	2·9	1	0

These guns, all, of course, muzzle-loaders, fired solid spherical shot, shell, grape, canister, or, sometimes, bar and chain-shot. They had low velocities and small range and penetration. In the first quarter of the 19th century somewhat heavier weapons, as the 42-pounder of 84 cwt., and later the 68-pounder of 95 cwt. began to be introduced; but until after the epoch of the Crimean war there was comparatively little improvement. The results of experiments which began to be carried out soon after that time led to the adoption by England of a formidable series of steel rifled muzzle-loading, built-up guns, which remained the ordinary "service" weapons until after 1880, and many of which are still in use on board ship. The chief of these may be classified as follows:—

Calibre.	Weight.	Weight of Projectile.	Weight of Powder.	Muzzle Penetration of Wrought Iron.
inches.	tons.	lb.	lb.	inches.
16·0	80	1,700	450	25
12·5	38	810	210	18
12·0	35	706	140	16
12·0	25	608	85	18
11·0	25	543	85	14
10·0	18	406	70	13
9·0	12	253	50	11
8·0	9	175	35	9
7·0	6·5	112	30	8
7·0	4·5	112	22	7
6·28	3·2	67	8	5

In the meantime breech-loading guns, on the screw-breech-closing principle, had also been partially adopted, but found unsatisfactory. After 1880, however, the progress made by other powers obliged Great Britain to look for another system, and finally the "interrupted screw" type of breech-closing apparatus was adopted for heavy guns. The chief breech-loading guns of the leading powers are now as follows:—

	Calibre.	Weight.	Weight of Projectile.	Weight of Powder.	Muzzle Penetration of Wrought Iron.
	inches.	tons.	lb.	lb.	inches.
British.	16·25	111	1,800	960	36·0
	13·5	67	1,250	630	30·4
	12·0	45	714	295	22·5
	10·0	29	500	250	
	9·2	22	380	175	20·3
	8·0	14	210	118	17·4
	6·0	5	100	42	12·1
	5·0	2	50	16	8·6
	4·0	1·3	25	12	7·3
	4·0	0·65	25	3·25	3·0
	3·4	0·35	21·8	6	
	3·0	0·35	12·3	4	
French.	16·54	75	1,984	870	29·4
	14·57	71	1,180	546	27·4
	13·39	52	926	357	25·5
	13·39	48	926	257	20·3
	12·6	38	760	189	18·3
	10·8	27	476	165	17·8
	10·8	23	476	92	14·3
	7·64	7·8	165	60	12·5
	6·49	4·9	99	40	10·8
	5·46	2·63	61·6	13	7·0
	3·15		18		
German.	12·01	35	725	202	20·5
	10·33	22	412	125	15·4
	9.45	19	474	152	18·1
	8·24	13	308	103	15·4
	6·8	5·5	117·9	30·9	10·3
	5·87	4	78·3	33	11·0
	3·09		12·4		
Italian.	17·0	101	2,000	725	32·8
	17·0	104	2,000	900	33·7
	5·91	4	80	34	11·2
	4·72	1·2	32	4·56	5·0
	3·0				
Russian.	12·0	50·5	782	255	23·6
	12·0	40	666	144	16·7
	11·0	28	516	115	15·5
	11·0	28	562	132	16·6
	9·0	15	249	64·2	11·7
	8·0	9·6	172	31·5	9·5
	6·0	4	86	18·1	8·4
	3·42		12·12		

As a rule guns of 50 tons weight and upwards cannot be worked without the intervention of steam, hydraulic, or pneumatic machinery; and, owing to the rapid excoriation of the bore, which is caused by the rush of the superheated powder-gases, the life of all such weapons is comparatively short. The newest development of the breech-loading gun is the quick-firing gun (q.v.). [*See* also CALIBRE, POWDER, PROJECTILE, SHELL, HIGH ORDNANCE, EXPLOSIVES, ARTILLERY, etc.]

Cannstatt, an ancient town of Würtemberg, is situated on the Neckar, 2½ miles N.E. of Stuttgart. It is resorted to for its mineral springs, and has manufactures in woollens, cotton, iron, etc.

Cannula, a tube used for evacuating fluids in certain surgical operations. It is commonly associated with a trochar, that is, a perforating instrument closely fitting the cannula and admitting of withdrawal from it when the puncture has been made. By means of a trochar and a cannula ascitic fluid is drawn off from the peritoneal cavity, hydrocele sacs are tapped and the fluid contents of cysts are evacuated; sometimes the cannula is connected with an aspirating apparatus, as in the removal of fluid from the pleural cavity. The tracheotomy cannula is a tube of suitable shape inserted into the trachea to procure ready access of air to the lungs in cases of laryngeal obstruction.

Cano, ALONSO, painter, was born in 1601 at Granada. By reason of his skill he was called the "Michael Angelo of Spain." In 1638 he was appointed painter and architect to the king, having acquired a reputation through his statues for the church of Lebrija. His wife having been murdered, he was suspected on account of his known ungovernable temper, and was subject to the torture, which, however, elicited no confession. He subsequently became a priest, and died in 1667.

Cañon, or CANYON, a Spanish name for a deep river-gorge with nearly perpendicular sides, such as those of the Colorado in the western United States. Cañons seem to result from streams passing from mountains with a considerable snowfall or rainfall through dry, almost rainless areas. The Grand Cañon of the Colorado is 218 miles long, from five to eleven miles wide, and from 4,500 to 6,500 feet deep. In one part the river flows in a chasm 3,000 feet deep and 3,000 feet wide, at the top of which is a plateau from five to six miles wide with walls 2,000 feet high, above which again is another plateau forty to sixty miles broad, boarded by a series of terraces or escarpments. The strata, cut through in the centre to a depth of 10,000 feet, and once continuous over the whole area, are nearly horizontal. The terraced escarpments and plateaux seem to be the work of ordinary sub-aërial denudation by rain, frost, sun, wind, and rivers, the vertical and comparatively narrow cañons marking a change to drier climatic conditions.

Canon. 1. Those books of Scripture universally recognised as genuine and inspired, as distinguished from those which are apocryphal or disputed. 2. The name of a church dignitary connected with a

cathedral; formerly canons were *regular* and *secular*, the latter living a non-monastic life, the former a strictly monastic. The *regular* canons no longer exist in the Church of England. Together with the dean the canons form the *chapter* of a cathedral. Minor canons and honorary canons are not included in the chapter. 3. A kind of musical composition, in which the voices take up, one after another, exactly the same melody, either at the same pitch or at a fixed interval.

Canoness, a member of a religious community of women, living together by rule, but not bound by vows. Endowed societies of such women, both "regular" and "secular" (the latter having few or no rules save that of celibacy) existed in Germany in the Middle Ages, and down to the Revolution in parts of France that had once belonged to the German empire. Some became Protestant at the Reformation and still exist under the name of "Stiften" (endowments) in Germany. They are often restricted to ladies of noble birth.

Canonicals, the name given to the ecclesiastical dress of a clergyman.

Canonisation, an act of the Pope, decreeing, after full inquiry, that a certain person who has already undergone beatification (q.v.) shall be admitted to the *canon*, or roll of saints, and be venerated publicly throughout the Catholic Church. The custom is said to be derived from the formal authorisation of new gods by the Roman senate. Down to the tenth century any metropolitan (q.v.) could canonise a martyr on the petition of the bishop of a diocese, after consultation with other bishops; after the tenth century each bishop could canonise (but this seems to have been hardly more than beatification). The first saint canonised (in the full sense) by a Pope was Ulrich, a bishop of Augsburg (993 A.D.). In 1070 Pope John XV. confined the power to the Pope, and in 1634 Urban VIII. laid down minute regulations to prevent abuse or mistake. The petition for canonisation is heard at Rome, in the presence of a "Promotor Fidei" (supporter of the Faith), commonly called Devil's Advocate, whose duty it is to attempt to find flaws in the character of the proposed saint, who must already have been beatified, and whose worth must have been proved by at least two well-attested miracles. Three successive congregations then deal with the question. The third is public, the Pope presides, and the postulant or advocate of the saint, who is usually a distinguished fellow-countryman, formally asks three times for his admission. Twice the Pope replies that the will of God must be further explored by prayer; litanies are then sung, and at the third time the Pope consents, and fixes a day for the formal canonisation, at which (together with elaborately symbolic ceremonies) the statue of the new saint is unveiled, a mass said in his honour, and thanksgivings offered for the new patron and intercessor obtained by the Church.

Canon Law, a collection of ecclesiastical constitutions for the regulation of the Church of Rome, consisting for the most part of ordinances of general and provincial councils, decrees promulgated by the popes with the sanction of the cardinals, and decretal epistles and bulls of the popes. The earliest canons are the apostolical canons, and though it has never been proved that they were the work of the Apostles, there is no doubt that they were promulgated at a very early period of ecclesiastical history. The Canon Law was first digested in 1151 by Gratian into the *Decretum Gratiani* or *Concordia Discordantium Canonum*, subsequently added to and continued by or at the request of Gregory IX. in 1230 in the *Decretalia Gregorii Noni*, subsequently still further added to by Boniface VIII. in 1208 in the *Sextus Decretalium*, afterwards by Clement V. in 1317, in the *Clementine Constitutions*, and completed by John XXII. in the *Extravagantes, i.e. Riders*. In addition to the Canon Law properly so-called, there exists also a large compilation of legatine and provincial constitutions which are generally treated as forming part of the Canon Law.

The introduction of this new code brought into existence a body of practitioners, commentators, and judges. The main object of the Canon Law was to establish (1) the supremacy of the ecclesiastical authority over the temporal, (2) the entire non-dependence of the clergy upon the laity, (3) that the laws of laymen cannot bind the Church to its prejudice, (4) that the constitutions of princes relating to ecclesiastical matters are of no authority, (5) that subjects owe no allegiance to an excommunicated lord. These are the most important doctrines of Gratian's *Decretum* and *Decretals*. The encroachments of the Church upon the temporal power were always disfavoured in England. There was, indeed, a kind of national Canon Law, composed of legatine and provincial constitutions, in force in the English Church. The former were ecclesiastical laws enacted in national synods held under the Cardinals Otho and Othobon, legates from Pope Gregory IX. and Clement IV., in the reign of Henry III. The provincial constitutions were the decrees of provincial synods held under divers Primates, from Stephen Langton, in the reign of Henry III., to Henry Chichele in the reign of Henry V., and adopted also by the Province of York in the reign of Henry VI.

With respect to these canons it was at the Reformation provided by a statute passed in the 25th year of the reign of Henry VIII. that they should be reviewed by the sovereign and certain commissioners, but that till such review should be made all canons, constitutions, ordinances, and synodals provincial, being then already made and not repugnant to the law of the land, or the king's prerogative, should still be in force. No review took place in Henry's time, but under Edward VI. a new code of ecclesiastical law was promulgated by a commission appointed by the Crown under statute. The confirmation of this was prevented by the death of the king; and although the project for a review of the old canons was revived in the reign of Elizabeth, it was soon dropped, and has not since been proceeded with.

So much of the English canons which existed previously to the statute of Henry VIII. before referred to as not repugnant to the Common or Statute Law

are still in force in this country. It was, however, long since decided that the canons of the Convocation of Canterbury in 1603 (which, though confirmed by King James I., never received the sanction of Parliament) *do not* (except so far as they are declaratory of the ancient Canon Law) bind the laity of this country. It has also been decided that not only the clergy but the laity were bound by the *then existing* canons, but that the canons of 1603 (and generally all canons subsequently made) never having received parliamentary sanction do not *proprio vigore* bind the laity, but the clergy only. In the ecclesiastical courts, consisting of the Archdeacon's Court, the Consistory Courts, the Court of Arches, the Court of Peculiars, the Prerogative Courts of the two Archbishops, the Faculty Court, and the Privy Council, which is the Appeal Court, founded entirely upon custom, the Canon Law is, under certain restrictions, used. It is also used in the courts of the Universities of Oxford and Cambridge, but the Canon Law in this case derives additional support from the Acts of Parliament which confirm the charters of these bodies. They are all, however, subject to the control of the Common Law, now administered by the High Court of Justice, which possesses the exclusive power of expounding all statutes relating to the ecclesiastical courts, and will prohibit them from going beyond the limits of their jurisdiction, and from all of them there lies an appeal to the sovereign in the last resort. Henry VIII. in the 27th year of his reign issued a mandate to the University of Cambridge that there should thenceforth be no lectures on Canon Law, nor any degrees whatever in that faculty conferred in the university for the future. Degrees in Canon Law have ever since been discontinued in England.

Canons of Descent. [DESCENT.]

Canopus, or CANOBUS, an ancient city of Egypt, between Alexandria and the western mouth of the Nile. It had a celebrated temple of Serapis, and the Canopic vases were vases used by the priests to hold the intestines of embalmed bodies.

Canopy, originally a mosquito net (Greek *cōnōps*, a gnat); hence its support overhanging the bed. Ecclesiastically, it means the covering of an altar, throne, or tomb. In architecture it is applied also to ornamental projections over doors and windows. There are richly carved and ornamented canopies in the Decorated and Perpendicular styles.

Canosa, ancient name *Canusium*, a town of S. Italy in the province of Bari, is situated on the right bank of the Aufidus or Ofanto, about six miles from Cannæ. It is famous for the antiquities that have been found here, and its ruins.

Canossa, an ancient castle of N. Italy, is celebrated as the spot where the Emperor Henry IV. remained shivering for three days beseeching Pope Gregory VII. to remov the ban of excommunication placed upon him (1077).

Canova, ANTONIO, sculptor, was born in 1757 at Possagno, a Venetian village. Displaying as a boy special talent in modelling, he won the patronage of a Venetian senator, who apprenticed him to a sculptor at Bassano. In 1779 he was sent to Rome with an introduction to the Venetian ambassador, and there produced his *Apollo*, and *Theseus with the Minotaur*. He next undertook, in 1783, the monument of Pope Clement XIV. in the Church of the Apostles, and in 1792 the monument of Pope Clement XIII. in St. Peter's. Among his imaginative performances may be mentioned *Venus and Adonis*, *Psyche holding a Butterfly*, *Repentant Magdalene*, *Hercules hurling Lichas into the Sea*, *Creugas and Damoxenos*, etc. He also did the monument of the tomb of the Archduchess Christina of Austria, 1797, and in 1803 executed in marble the colossal model of a statue of the King of Naples. About this time, too, was completed his *Perseus with the head of Medusa*, a work that increased his renown more than all his former efforts. In 1802 appointed curator of all Roman works of art in the Papal states, he was invited by Bonaparte to Paris to make the model of his colossal statue. Later works were a colossal *Washington*, *Venus rising from the Bath*, *The Graces rising from the Bath*, *Dancing Girl*, etc. In 1815 he was sent to Paris to recover the works of art that had been taken away from Rome, and on his return was created Marquis of Ischia. He died in 1822 at Venice.

Canrobert, FRANÇOIS CERTAIN DE, French marshal, was born in 1809 at St. Céré. After receiving a military training at Saint Cyr, he distinguished himself in the Algerian war of 1835. He aided Louis Napoleon in the *coup d'état* of 1851, and commanded in the Crimea under Saint Arnaud, on whose death he succeeded to the chief command. Owing to some differences with Lord Raglan he, in May 1855, resigned his command to General Pélissier. In the Italian war of 1859 he led the third division of the French army, being present at the battles of Magenta and Solferino, and in the Franco-German war he acted under Marshal Bazaine, with whom he was shut up in Metz, being retained for some time as a prisoner in Germany. Thereafter, he was returned to the Chamber for the department of Lot, but, being defeated in 1876, entered the Senate. He died in 1895.

Cant, ANDREW, was born about 1610, and in 1638, having entered the Presbyterian ministry, was incumbent of Pitsligo, whence he was transferred to Aberdeen. He served as chaplain to the army of the Covenanters, but is said to have combined an unbridled hatred of episcopacy with a fearless devotion to the Royalist cause. Once his denunciation of Cromwell nearly cost him his life, but he boldly laid bare his breast, and bade his assailants strike. At the Restoration he was ejected, dying in 1664. The word "cant" has been erroneously supposed to be derived from his name.

Cantabile, in *Music*, a term applied to movements intended to be performed in a graceful and flowing style.

Cantabri, in ancient times a tribe of Spain occupying the centre of the N. side from the mountains to the coast. They were a fierce, savage people, first definitely subdued by Augustus, B.C. 25.

and a revolt among them was suppressed by Agrippa, B.C. 18. Probably the modern Basques are their descendants.

Cantacuzene, or CANTACUZENUS, the name of a distinguished Greek family that came into prominence in the thirteenth century, and still has representatives in Central Europe.

1. JOHN V. was prime minister to the Byzantine Emperor Andronicus III., and regent during the minority of his son, John Palæologus (1341). The intrigues of the empress-mother, Anne, compelled him to usurp the purple, and a civil war ensued, which resulted in his joint occupation of the throne with his ward (1347). Dissensions broke out again, and in 1355 he retired to a monastery, where, under the name of Joasaphus Christodulus, he composed his famous *History of the Byzantine Empire from 1320 to 1355*. The date of his death is unknown, but he is said to have lived over a century.

2. MATTHEW, son of the foregoing, born about 1325, asserted his title after his father's retirement, but was defeated by John, made prisoner, and forced to enter a cloister.

3. SERBAN, on the strength of his supposed descent from John V., claimed the imperial crown, but was imprisoned in 1672. Released by the Turks, to whom he feigned submission, he became Waiwode of Wallachia in 1678. He conspired with Leopold of Austria and the Czar to shake off the Mussulman yoke, but just as he was about to take up arms he died (1685), poisoned, it is said, by his nephew Constantine Brancovan.

4. DEMETRIUS, Waiwode of Moldavia, was driven out by his subjects in 1679, owing to his tyranny. He was subsequently restored, but was finally deposed by Ibrahim Pasha in 1685.

5. CONSTANTINE BRANCOVAN BESSARABA, became Waiwode of Wallachia in 1688. As a vassal of the Porte he was compelled to give the Turks his nominal support in their struggle with Austria, but secretly he assisted the Emperor Leopold, who made him a Prince of the Holy Roman Empire, a title still preserved in the family. In 1699 the peace of Carlowitz, followed by the death of Leopold (1705), deprived him of any hope of relief from Turkish bondage by the help of Austria, and he therefore turned to Peter the Great of Russia. His designs were known at Constantinople, and Demetrius Cantimir of Moldavia was employed to effect his ruin, but the latter also conspired with Russia, and was denounced by his rival. In 1711 a Russian army was sent to invade Wallachia, being assured of Constantine's help, but the Grand Vizier was first in the field, got possession of the supplies destined for the Muscovite troops, and forced them into a treaty which made Wallachia and Moldavia absolutely dependent on the Porte. Constantine, in spite of his detected treachery, was allowed to remain in power until 1714, when he was carried to Constantinople, cruelly tortured, and executed with his four sons. His grandson was spared, from whom the Brancovans of to-day trace their descent.

6. STEPHEN III., cousin and successor of the foregoing, was used by Turks for two years as nominal ruler of Wallachia after the extinction of the Brancovans. In 1716, however, he was deposed and put to death, and with him ended the Cantacuzene dynasty in the Principalities.

Cantarini, SIMONE, also known as Simone de Pesaro or "The Pesarese," born at Pesaro, N. Italy, in 1612, studied painting under Guido Reni at Bologna, and became a skilful imitator of his master's style. Under the patronage of the duke he migrated to Mantua; his temper lost him his friend, and he then moved to Verona, dying there in 1648. His best pieces are a *San Domenico*, a *Magdalene*, several portraits, and some spirited etchings. His colouring is good, but he lacks originality.

Cantata, originally a musical recitation of a story in verse by one person. Later, an air was introduced at certain points; this form was much cultivated in the seventeenth century. A more elaborate form was the Church Cantata, brought to perfection by Sebastian Bach. In modern times sacred cantatas are a kind of minor and less elaborate oratorio. Secular cantatas are described as lyric dramas, intended only for musical, not for theatrical representation.

Canteen (French *cantine*, waterbottle), a military drinking bottle, or flask for carrying water; more commonly the place in barracks or in a camp where drink is permitted to be sold. In the English army canteens are under regimental management, and frequently supply groceries, stationery, etc.

Canterbury, a province occupying all the central portion of South or Middle Island, New Zealand, and having Nelson to the north, Otago to the south, Westland to the west, and the Pacific Ocean to the east. The total length is about 200 miles, the breadth 150 miles, with a population (1908) of 171,318. On the western border rises the range known as the Southern Alps, forming almost an impassable barrier. Mount Cook, the highest peak, attains an elevation of 12,460 feet, and Mounts Stokes, Murchison, Darwin, Brewster, Forbes, and Tyndall are not much inferior, their summits being clothed in perpetual snow. From the huge glaciers on their flanks descend numerous streams, such as the Ashburton, Ashley, Waimakariri, Rakaia, Selwyn, etc., for the most part swift, shallow, and subject to floods. The country slopes gradually down to the east in a series of wide grassy expanses, called the Canterbury Downs, which extend over 3,000,000 acres and afford pasturage for countless flocks of sheep. Farther east still is Banks' Peninsula, a volcanic district of great fertility, with Akaroa harbour at its extremity. The first colony was established in 1850 by a Church of England Association, under the delusive idea that it might be possible to rear up a kind of Anglican Utopia at the Antipodes. The experiment failed from an ecclesiastical point of view, and was many years before it proved an economical success. Christchurch, the capital, is connected by railway with the chief port, Lyttelton, which is situated on Pegasus Bay to the north of Banks' Peninsula, and the railway is now further extended to the south-west. Other towns are Timaru, Kaiapoi, Rangiora. Sheep-farming has hitherto been the principal industry, but wheat, fruits, and

flax are grown with profit. There is excellent timber, and the culture of silk has met with some success. The mineral resources are not fully explored, but iron, coal, building-stone, and precious metals have been worked advantageously.

Canterbury, on the river Stour, in the county of Kent, 56 miles S.E. of London, is a municipal and parliamentary borough, returning one member, a county in itself, and the centre of the metropolitan see. Few English cities can boast of greater antiquity. Druidical remains point to its existence before the invasion of the Romans, who knew it as Durovernum, fortified it with walls, and evidently had

CANTERBURY CATHEDRAL, FROM THE GATEWAY. (*From a photograph by G. W. Wilson and Co., Aberdeen.*)

a flourishing settlement there. Under the Saxons it assumed its present name Cantwara-byrig, or "borough of the men of Kent," and as the capital of Ethelbert, King of Kent and Bretwalda, was the scene of that sovereign's baptism by Augustine in 596. The archiepiscopal see was then founded, and the abbey of St. Augustine and the priory of Christ Church were raised. The former fell into decay and ruin, but in 1848 was made the site of a missionary college, in which the beautiful fourteenth century gateway and the remains of the abbot's hall and fine church are preserved. The latter grew into the cathedral church, which was founded on the remains of a Roman church by Lanfranc in 1070, but the existing building really dates from Anselm's enlargement of the structure in 1172, and was not completed until 1500. It has since been restored and repaired at various times. The architecture illustrates various successive developments of art and taste from the Norman period to the latest phase of Early English. The scene of the murder of Thomas à Becket (1170), which made the church a resort for pilgrims, the spot occupied by his shrine, until it was swept away by Henry VIII., the monuments of the Black Prince, of Henry IV. and his queen, and of many archbishops, and the remains of the twelfth century glass and of Norman frescoes, are points of great interest. The crypt contains a church set apart by Queen Elizabeth for the use of French Protestants, and still retained by them. Connected with the ecclesiastical foundation, which consists of a dean, six canons, four minor canons, six preachers, and other officers, is the king's school established by Henry VIII. Of the twenty other churches, ancient and modern, within the limits of the borough, that of St. Martin, where Bertha, Ethelbert's queen, worshipped, and where the king was baptised, bears traces of Saxon masonry, and is in many ways remarkable. There are remains also of several convents, and three venerable hospitals still serve as almshouses. Parts of the original city walls, with additions of later date, may be seen, and the Dane John, a conical mound, now the centre of a public garden, is attributed to Danish hands. The Norman keep, erected by Bishop Gundulph, and the west gate of the city (1380), with sundry specimens of domestic architecture, complete the list of secular antiquities, for of the Chequers inn, where Chaucer's pilgrims alighted, scarcely a vestige is left. Among modern institutions are the Beaney Institute, with its museum, library, and art galleries, the Clergy Orphan School, the Kent and Canterbury hospital, the Guildhall (a small building

disfigured by a brick casing), the barracks, which serve now as a depôt for all cavalry regiments quartered abroad, and the Sidney Cooper school of art. The market is well supplied with sheep, cattle, and agricultural produce, especially hops, which are grown to perfection in the district. Some linen and woollen goods are made, and brewing is an important local industry. There are three stations on the South Eastern and Chatham Railway. Pop. (1901), 24,868.

Cantharis, CANTHARIDIN, the active principle obtained from the Spanish fly, is a powerful irritant, and is employed in medicine as a means of producing vesication or blistering of the skin. There are several pharmacopœial preparations, of which the most important are the *plaster* and *ointment* of *cantharides*; the *charta epispastica*, and the *liquor epispasticus*. Cantharidin, when absorbed into the system, has a specific action upon the kidneys, and blisters must be very cautiously applied, if they are used at all, in the subjects of kidney disease. [BLISTERS.]

Canticles, literally short portions of Scripture or of theological compositions sung in the church. But the name is generally applied to what is called in the English Church "The Song of Solomon," and in the Roman Church the "Song of Songs." Critics have held many and widely differing views of it, some thinking it an allegorical setting forth of the mystic union of Christ and His Church—a view favoured by the compilers of the Authorised Version of the Scriptures—others taking it as describing Christ's dealings with the individual soul, and others again considering it to be neither more nor less than a drama of earthly love. Among the Jews its mystic interpretation is that it sets forth God's dealings with His chosen people. It appears that the Jewish doctors declared it canonical about 90 A.D., but it was not looked on before the Christian era as allegorically expressing Jehovah's relation to His people. The later modern criticism, which is rationalistic in tone, looks on it as either a complete love poem or as a collection of many fragments. Some of the rather warm images and descriptions in the poem are, on this theory, songs of the harem intended to enthral the imagination of the heroine. It remains to be pointed out that the authorised translation is said to contain some inaccuracies caused by the desire of the translators to make the poem harmonise with their foregone conclusions as to its nature.

Cantilever, in *Engineering*, is a special type of girder which, since its introduction on the Forth Bridge, is being generally adopted on girder bridges of large span all over the world. Essentially it means a girder fixed at one end and free at the other. The free ends of two cantilevers pointing towards each other may be connected by placing a smaller girder across, each free end supporting half the weight of the girder. The greatest strength of section is wanted at the fixed end, and consequently large cantilevers cannot be made uniform for their whole length, but must taper towards the free end. (*See* Plate of Bridges, facing p. 190, Vol. II.) They are usually made of steel, and, as with ordinary metal girders, open lattice-work is used to brace the top and bottom booms together. In the Forth Bridge cantilevers are placed back to back so as to form three double brackets and therefore four spans, each bracket being balanced by the symmetrical disposition of its two cantilevers.

Canting is the term employed in the science of arms to denote what is otherwise understood by the word "*punning*." It is used when the arms, crest, or motto bear some evident relation to, or are a play upon, the name of the family to whom they belong; and also when the motto bears this same relation to the coat or crest. Though by some people this class of heraldry has been rather despised, the case should really be very much the reverse, as nearly all the armorial bearings which it has been possible to trace to their actual origin have proved to be of this character. A good example of "canting" insignia is afforded by the Barnard family, who bear "Argent a bear rampant sable, muzzled or" and for a crest "Out of a ducal coronet or, a demi-bear as in the arms." The motto is "Fer et perfer," the translation of which—bear and forbear (fore-bear)—is robbed somewhat of its Christian sentiment by the evident pun which has been perpetrated.

Canton is one of the subordinaries of heraldry, and is a small square, which, unless specifically stated to be on the sinister side, always occupies the dexter chief corner of the escutcheon. It is supposed to contain the ninth part of the "field." An honourable augmentation is frequently placed upon a canton, and a very general example of this is shown in the manner in which the "badge of Ulster" is usually displayed upon a simple coat (*i.e.* not quartered) by the baronets of Ireland and the United Kingdom. A modern case, which may be quoted, is that of the late Sir William Gull, Bart., to whose arms were added a canton ermine, thereon an ostrich feather argent, quilled or enfiled by the coronet which encircles the badge of the Prince of Wales.

Canton (Chin. *Sang-Ching*, City of Perfection), the capital of the province of Quang-tung, China, is a port on the left bank of the Canton or Pearl river (Chu-Kiang), about 70 miles from its mouth and 45 miles above the Bogue (q.v.). The city proper is surrounded by a brick wall six or seven miles in circumference, with twelve gates. This area is divided by an inner wall into the Old Town to the north, the seat of the government offices and the residence of the Tartar population; and the New Town, which is the Chinese quarter. The suburbs are extensive, and at least a quarter of a million out of the total population of approximately two millions, live entirely on boats. Along the river bank is a space of 24 acres, surrounded by a granite wall and a canal, for the foreign factories. The native streets are very narrow, and have brick houses, with mud huts for the poor. The river, dividing into two channels, forms the island of Honam, upon which is a great temple, and many other joss-houses and pagodas are scattered over the city, which also possesses a Mohammedan mosque. Canton is a great educational centre, and the great hall of examinations will accommodate

7,000 students. There are several missionary establishments and an English and American hospital. Daily steamers run to Hong-Kong and Macao. An enormous trade is done here, the exports being tea, silk, nankeen, camphor, mother-of-pearl, tortoiseshell, and China ware, representing an aggregate annual value of upwards of £14,000,000; whilst cotton and woollen cloths, opium, furs, watches, etc., are imported. Canton was bombarded by the British in 1841, 1847, and 1856, and from 1858 to 1862 was occupied by the allies as a guarantee for the war indemnity.

Canton, a word used in Switzerland to denote a subdivision of the country, forming a separate territorial state, having a government of its own; but being at the same time a member of the Swiss Confederation. The derivation of the word is disputed, though it doubtless has some reference to cutting off an angle and so, in a measure, squaring a piece of land. The word in different forms exists in many languages. In Kent (itself an example of the word) a portion of land upon which the right of cutting brush-wood is leased is still called a cant or kant.

Canton, JOHN, was born at Stroud, Gloucestershire, in 1718, and brought up as a weaver of broadcloth. He spent his leisure in the study of mathematics, and in 1739 got a mastership in a school at Spitalfields. He now busied himself with electricity, and in 1750 won the gold medal of the Royal Society for his method of making artificial magnets. He subsequently served on the council of that body, and we owe to him the pith-ball electrometer, and the suggestion of the compressibility of water, and of the opposite electricity of clouds. He died in 1772.

Cantonment, a word generally restricted to a kind of permanent camp or military town adopted for the use of British troops in India. It generally consists of barracks for European soldiers, with bungalows and gardens for the officers, magazines and parade grounds, huts for the native soldiers, and a bazaar for the camp-followers and other hangers-on of military life. Readers of the accounts of the Indian Mutiny will remember how, when the Sepoy regiments besieged their officers in the barracks and mess-rooms, the more distant bungalows were often the scene of plunder and of the slaughter of women and children.

Canton River, or Pearl River (Chin. *Chu-Kiang*), is the lower part of the Pe-Kiang, which is navigable for 300 miles through the provinces of Quang-tung and Kiang-See. It is joined about four miles west of Canton by a branch of the Si-Kiang. Near the city it is crowded with craft of all kinds, and has depth enough for vessels of 1,000 tons. Foreign ships, however, usually unload at Whampoa, 15 miles lower down. Between Canton and the sea it has many islands, some of which are fortified, and below the Bogue, or Bocca Tigris, it forms a large estuary called the "Outer Waters."

Canth, CESARE, born at Brivio in 1805, became very early a professor of literature at Sondrio, subsequently moving to Como and then to Milan. His liberal opinions, expressed both in prose and verse, brought upon him the wrath of the Austrians, who in 1842 imprisoned him. He employed his solitude in composing his *Storia Universale*, a work of merit as well as of magnitude. His other more important books are a *History of Italian Literature*, a *History of the Last Hundred Years*, and *Letture Giovanelli*, a popular compilation for educational purposes. He took part in the unsuccessful Piedmontese rising of 1848, and for some years found a refuge at Turin. The Austrians, however, allowed him to return, as his influence was more formidable abroad. He died in 1881.

Canute, or CNUT, the son of Sweyn or Swend, King of Denmark and England, was born about 995, and succeeded his father in 1014. The English refused at first to recognise him, and recalled Edmund Ironsides, who for two years maintained a fierce struggle against the foreigners, but in 1016 was fain to agree to a division of the kingdom. Next year Edmund died, perhaps of treachery at which his rival connived, and Canute became sole monarch. Until he had crushed out the opposition of the Saxon element his rule was stern and cruel. He banished Edmund's sons, put Edwy his brother to death, and imposed a danegeld; but when his position was secure, he adopted a wise conciliatory policy, administering justice with impartiality, promoting men of native race such as Godwin, and in every way advancing the prosperity of his people. The rebuke which he gave his courtiers, who tried to persuade him that he could command the waves, proves his reputation for common sense, and the song composed by him as he rowed past the monastery of Ely shows that he cultivated the English tongue. He conquered Norway, extended his power over Wales and Scotland, and consolidated a great northern empire. On his return from a pilgrimage to Rome he founded the monasteries of St. Benet, St. Edmund's Bury, and Holme. He died in 1035 at Shaftesbury, and his wide dominions were soon dismembered after his death.

Canvas (Lat. *cannabis*, hemp), a kind of coarse, unbleached, hempen cloth, used for sails, paintings, etc. "Sail canvas is 18 to 24 in. wide, and numbered 0 to 8, 0 being thickest. A *bolt* of canvas is 39 to 40 yards long, and weighs 28 to 48 lbs." Also, the unbleached cloth, regularly woven in squares, which is used for tapestry work.

Canvasback Duck (*Fuligina vallisneria*), a North American duck, highly esteemed for the table. The male is white with wavy black markings, head tinged with black, neck glossy chestnut, black pectoral belt. According to Nuttall, the principal food of these birds is not the freshwater plant which serves them for a specific name, but the marine grass-wrack (*Zostera marina*). [POCHARD.]

Canzone, a short song in which the music is much more important than the words. Sometimes, also, the term has been applied to instrumental compositions.

Caoutchouc, or INDIARUBBER, a tough elastic substance obtained by drying the milky sap of certain tropical trees, as *Jatropha elastica, Siphonia cateehu*, etc. It is composed of carbon and hydrogen, and is soluble in oil of turpentine, benzine, and carbon disulphide. It is applied to a variety of purposes, as for the manufacture of tyres for motor vehicles, bicycles, etc., for tubing and gas bags, and to render fabrics waterproof, and many other purposes. When combined with two or three per cent. of sulphur it becomes more supple and elastic, and is known as vulcanised caoutchouc. If combined with more sulphur it becomes harder and capable of taking a polish. It is then known as Ebonite or Vulcanite, and is much used for electrical instruments and other purposes. In 1910 very high prices were current for raw rubber.

Capacity has the same signification in common parlance as content or volume in mathematics. In physics the term indicates power of holding or retaining. For instance, the capacity of a given body for heat, water, etc. In legal phraseology it means the capability or otherwise of persons to do certain acts, as, for instance, to purchase or convey property, to commit crime of any kind, to hold office, etc.

Capacity, ELECTRICAL, of a conductor, is understood to mean the quantity of electricity contained on it when charged to unit potential. *i.e.* it is the quantity required to produce a charge at the standard intensity of electrical pressure or potential (q.v.). Inasmuch as the electrical pressure depends on the position of the conductor in relation to other bodies, so must the capacity of the body vary as its position varies. The standard capacity is that of a conductor which requires just one *coulomb* of electricity—the unit quantity, to bring its potential to one *volt*—the unit potential. This unit capacity is called the *farad*, but is so great that for practical purposes the unit adopted is its millionth part, the *microfarad*. The capacity of a mile length of ordinary submarine cable is about one-third of a microfarad.

Caparisoned is an heraldic term applied to horses, and is used to signify that the animal is completely harnessed. Though occasionally used alone, it is more frequently to be found in conjunction with the word "bridled." A horse may be caparisoned in the ancient or the modern style, and the age of the crest will generally be a sufficient guide upon this point, but the word "caparisoned" is so indefinite as to this, and includes with some writers so much, and with others so little, that it is wiser (as is usually done) to supplement the blazon with other and more particular details.

Cape Breton, an island at the extremity of Nova Scotia, British North America, being separated from the mainland by the Strait of Canso, nowhere more than 1½ miles broad. It is about 100 miles long by 85 miles broad, and has an area of 3,120 square miles. The coast is deeply indented, and the Bras d'Or, a land-locked gulf, extends for 50 miles inland, and is connected with the Atlantic by a canal. There are many small rivers and some lakes. The surface is diversified but not mountainous, the greatest elevation being 1,800 feet in the N. Much of it is covered with forests of pine, oak, birch, and maple—a source of considerable wealth. Only a small portion is under cultivation, but the yield of cereals, turnips, and potatoes is good. Numbers of horses, cattle, and sheep are reared, and cheese and butter are largely exported. Coal, limestone, and gypsum are worked, and iron-ore and slate are plentiful. Fishing, however, is the chief industry, the rivers yielding immense supplies of salmon, whilst the coast abounds with all sorts of sea fish. The island was discovered by Sebastian Cabot, and Lord Ochiltree settled a small colony there in 1629, but was expelled by the French, who held it (under the name of Ile Royale) more or less continuously until its capture by Boscawen in 1756, since which it has been a British possession. It was finally incorporated with Nova Scotia in 1819, and sends five members to the Canadian parliament. The inhabitants are chiefly Scots or French, with some Irish and a few Indians. It is divided into four counties; Sydney is the capital, Arichat and Port Hood being towns of some importance.

Cape Coast Castle, or CABO CORSO, was formerly the capital of the British settlements on the coast of Guinea, West Africa. The castle itself occupies a granite rock projecting into the sea, and is flanked by Forts William and Victoria. Moisture, heat, a swampy soil, and a deficiency of drinking water make the climate unhealthy, but in the last ten years many sanitary improvements have been effected. The natives principally consist of Fanti negroes, with a proportion of Kroomen and mulattoes. The Portuguese were the earliest colonists, but they were displaced by the Danes (1658) and the Dutch (1659). The English occupied the place in 1664, and have held it ever since, the government being in the hands of a president, who is subordinate to the Governor of the Gold Coast. Palm oil, maize, gold dust, and tortoiseshell are the chief exports.

Cape Cod, a peninsula on the coast of Massachusetts, U.S.A., having a length of 65 miles, by a breadth of about 8 miles, and enclosing in its bend Cape Cod Bay, which opens northwards into Massachusetts Bay, and has on its western shore the port of Plymouth, where the *Mayflower* disembarked the Pilgrim Fathers (1620). A railway runs part of the way up the peninsula.

Cape Colony, or the "Colony of the Cape of Good Hope," is a British possession in South Africa, merged in June, 1910, with other South African territories into the Union of South Africa (q.v.), which latter includes Natal, Zululand, Transvaal, Orange River Colony, and Cape Colony. It comprises not only the colony proper, but Pondoland, Bechuanaland, Walfish Bay, E. Griqualand, Tembuland, and Transkei, with some adjoining islets in the German territory of Damaraland and Great Namaqualand. Originally a comparatively small area in the vicinity of the Cape of Good

Hope, it now has an area of 276,995 sq. miles, of which the colony proper has 206,860 sq. miles. At a distance of from 100 to 150 miles from the coast there are *ranges of mountains* known in different portions of their stretch across the country as the Kahlamba or Drakenberg, the Stormberg, the Zwarte Bergen, the Zuurberg, the Sneeuwberg, the Winterberg, the Nieuweveld Mountains, the Roggeveld, and the Kamiesberg. The average height of this mountainous belt is nearly 6,000 ft., the highest point being Catkin Peak (10,300 ft.), Compass Peak (8,300 ft.), and Bulbhouders Bank, which is 7,300 ft. above the sea. These mountains, however, actually consist of parallel ranges intersected by deep ravines or "kloofs," the central range, in which are the peaks named, being the "divide" between the coast-flowing streams and the tributaries of the Orange river in the north. From the sea to the foot of these mountains in the south-western part of the colony lies the chief grain and wine-producing country; in the south there are extensive forests, while tobacco and maize are largely cultivated in the almost tropical districts along the S.E. coasts. A series of terraces, or plateaux, of which the supporting walls are the ranges in question, form characteristic features of the colony from the sea inward. One of the most remarkable of these is the Great Karroo, an elevated region extending from W. to E. between the two upper ranges for 300 miles, with a breadth of 70 miles. For the greater part of the year it is dry and barren, though, owing to its elevation (3,000 ft.), cool; but during the rainy season it is covered with a luxuriant pasture on which feed vast flocks of sheep, herds of cattle, and droves of horses. Here also ostrich farming is carried on, and though this industry is no longer so lucrative as in its earlier years, between 1866–90 over a thousand tons of feathers were exported from the Cape. The still more elevated country to the north of the mountains is a part of the great table-land of Africa. Like the more southern districts, it supports sheep. In addition it contains the chief mineral districts, including the gold and diamond fields which, within a few years, have so largely contributed to the world's wealth, and the prosperity of what was previously mainly an agricultural and pastoral colony.

The *rivers* of the Cape Colony, though numerous, are not navigable for large craft or for long distances, and most of them are useless for irrigating purposes, being, except when swollen by the rains, mere shallow torrents flowing in deep "kloofs" with precipitous walls, while even the few which can float small craft through part of the coast region are so impeded by bars as to render their entrance difficult and dangerous. The *coast* again is deficient in good harbours, most of the anchorages being bays with wide mouths and shallow water. Table Bay (the harbour of Cape Town) is the principal port. False Bay, including Simon's Bay, is the Imperial naval station. Most of the Little Namaqualand copper is shipped from Port Nolloth on the N.W. coast. At Mossel Bay there is a fair anchorage; the same may be said for the Knysna river, and at Algoa Bay, owing to the establishment of Port Elizabeth on its western shore, there is much shipping, though, as in most of the other harbours, goods must be transferred to lighters, while Port Alfred, at the mouth of the Kowie river, East London, at the mouth of the Buffalo river, and St. John's river (acquired by purchase from the Pondo chief in 1878, and annexed to the Colony in 1884) are being much improved.

The *climate* of the Cape Colony is, as a whole, extremely healthy, its dryness attracting visitors affected with pulmonary complaints just at the season when (owing to the reversion of the seasons) the northern hemisphere is most inclement. The coast region is damper than the far interior, where irrigation is requisite. But the atmosphere of the plateaux is the best and most exhilarating, the temperature seldom rising to 100° or falling to 23°, while the average number of rainy days is between seventy and ninety, either on the coast or in the interior, though in the latter the amount of rain is more, namely, about 19 in. at Port Elizabeth, and 34 in. at Cape Town. The eastern province is, therefore,

MAP OF CAPE COLONY.

more varied with grassy places and wooded watercourses than any other area, the Karroo bush not sufficing to cover the bare flat-topped hills which form such marked features of the dreary scenery of the western region, and much of the midland, though this bush affords excellent feeding for sheep, countless flocks of which graze in this seemingly desert plateau. But in the vineyard and agricultural country of the extreme south there are many pleasant looking districts, and some parts of the eastern province are actually beautiful.

The *soil*, as a rule, is thin, but very rich, and except where saline—as in some of the interior districts—only requires water to stimulate it into bearing the heaviest crops. A "veldt" or upland pasture which seems at one season a mere burnt-up waste, appears a week or two later luxuriant with

"sweet" or "sour" grass, to apply the local names to the kind of herbage it bears, and after a "vlei" or shallow sheet of rain-water has lain on the most arid spots in the Karroo, the cattle wallow for weeks in the richest of forage. But, except in the south, a dam for the storage of water for irrigating purposes is one of the first requisites of every farm or settlement; for the Cape Colony, be it a little wetter or a little drier, is emphatically "a land of thirst." The summer months are December, January, February, when the dry S.E. trade-winds blow fiercely, but in the eastern divisions heavy rains moderate the heat, though little of this reaches the west, being for the most part expended on the eastern slopes of the ranges mentioned. Hence, Namaqualand, like the German country to the north, is almost rainless.

The *zoology* of the colony is peculiar for the great assemblage of large animals within its bounds, as if they had been driven to take refuge in this area, and been unable to proceed any farther on account of the sea. The lion is now extinct in the settled districts, and buffaloes and elephants are preserved only in the Knysna and Zitzikama forests. But though lessened in number by the relentless persecution which they have met with from the colonists, and from professional hunters and sportsmen, numerous species of antelope, with monkeys, wild cats, porcupines, ant-eaters, tiger cats, jackals, "wild dogs," hyænas, the "aard-wolf" (Proteles), and other mammals keep their ground. The rhinoceros, giraffe, hippopotamus, eland, gnu, and some other species have been banished from the colony, and the quagga is believed to be extinct. Ostriches, once numerous, are now sparsely scattered, the supply of feathers being at present derived mainly from domesticated birds, or from regions beyond the Orange river. The secretary bird, the honey bird, and the weaver bird are among the peculiar species of its ornithology. Reptiles are still numerous. The cobra di capello and the puff-adder are among the venomous snakes; but the alligator is now seldom seen within the bounds of the colony. The honey bee is wild. Termites or white ants rear their conical mounds everywhere, and among venomous insects, or their allies, scorpions, tarantulas, and hornets may be enumerated.

Among useful *plants* the following timber trees deserve notice: Yellowwood, black ironwood, stinkhout, melkhout, and nieshout, and the assegai, or Cape lance-wood. Bulbous plants and heaths are most characteristic members of the flora. Our conservatories are filled with the latter, of which there are a large number of forms. Proteas, various species of iris, amaryllidaceæ, pelargonium, spurges, the elephant's foot or Hottentot's bread, the stapelia or carrion flower, the Kei apple, gourds, water melon, etc., abound. The flora bears a general resemblance to that of Australia, but it is richer, and in certain orders attains a profusion which stamps it as peculiar. From Algoa Bay northwards the vegetation is essentially tropical. From Oliphant's Bay to Port Elizabeth there is a second type. From Beaufort West to near the Orange river there is a third division, while the Karroo and the Kalahari Desert form each a distinct botanical region.

The chief *industries* of the Cape are sheep, horse, and cattle rearing, ostrich farming, viticulture, and the growing of wheat, barley, oats, maize, and tobacco, though as yet the domestic demand for the latter has not been met. According to the census of 1904, the colony contained 1,954,390 cattle, 11,818,829 sheep, 7,162,463 goats, 419,963 horses and mules, and 357,970 ostriches. Most of the country is in pastoral farms, estates of from 3,000 to 15,000 acres being not uncommon, though of these immense tracts little is under the plough. The copper mines of Namaqualand are very rich, gold is mined in the Knysna districts, and manganese in the Paarl. Some coal is raised, though not enough for colonial use and the requirements of the steamers calling. Iron is abundant in many places, so is lead, and zincblende, though their smelting are industries which belong to the future. Building stones and marbles are plentiful, and precious stones of various kinds are reckoned among the wealth of the colony. But none of its products are equal in value to the diamonds, which, since 1867, have been dug in the North, Kimberley being the centre of this lucrative industry, which, by the latest statistics, yield about 2,000,000 carats per annum, and the output up to 1904 was valued (though many of the stones were small, "off colour," and in other respects almost worthless) at £60,000,000.

Manufactures are still in their infancy; Cape wines and brandy, being now more carefully prepared, are beginning to find a market, and the exportation of fruit to the northern hemisphere at a time when the supplies in Europe and North America are exhausted is likely to be a source of great profit in the future. Waggon and furniture making, fishing and the preserving of fish, tanning, leather work, iron founding, the weaving of woollens, biscuit-baking, jam and jelly making, and the digging of guano on the little islets off the West coast complete the more notable list of colonial industries.

The *population* of the Cape, including the Transkeian territories, East Griqualand, and Tembuland, is at present about 2,409,804. Of these about 579,741 are of European descent. In the western district the Dutch and the Dutch language preponderate, but the English are most numerous in the eastern districts. They are also regarded as the most enterprising, and though both languages are in official use, and the rivalry between the two races—the old colonial stock and the new, whose advent in any numbers dates from the beginning of this century—is still keen and at times evenly-balanced, the English tongue, like the British people, is likely to gain the upper hand. The native population belong to the Kaffir, Hottentot, and Bushmen races. The two latter, though, like the former, on the increase, are the least numerous: they do not comprise more than 13 per cent. of the colonial population, while the former, in all its numerous branches, is estimated to make up 40 per cent. of the Cape people. There are about 1½ per cent. of Malays, and 12 per cent.

of mixed races. The native population is progressing, and forming the great preponderance of labourers, permit little room for the introduction of many poor whites, except skilled artisans. They have ceased to give much trouble. In the dependencies of the Transkei, East Griqualand, and Tembuland, there are altogether about 411,000 aborigines. The population of the chief towns in 1904 was:—Cape Town (exclusive of soldiers and shipping), 77,668; Grahamstown, 13,877; Port Elizabeth, 32,959; Kimberley, 34,331; and Beaconsfield, 9,378, with municipal governments all formed on the English model, though, like the general government, largely tinctured with the Dutch system on which they were engrafted. Good *roads* and *railroads* afford easy access to most parts of the colony. The former are traversed mainly by bullock waggons, or by mule teams. The latter, with a few exceptions, are public property, the capital expended on the 3,191 miles now open for traffic being at the date of the last financial return £31,276,196, showing a cost of £9,801 per mile. More than 8,196 miles of telegraph thread the colony. Including volunteers, the *colonial forces* number over 8,000 officers and men; but every male citizen is liable to military duty. The public *revenue* for 1906–7 was £7,733,241, the expenditure £8,373,696. The public debt is £49,199,918, including £6,770,387 contracted by towns and other corporate bodies, though guaranteed in the general revenue. The total exports in 1906 amounted to £40,492,233, and the imports to £2,807,367, the greater part of the trade being with the United Kingdom.

The colony (which consists of seventy-seven divisions, and the dependencies of thirty districts) has since 1872 been under responsible *government*, the governor alone being appointed by the Crown. The Legislative Council consists of twenty-six elected members, and the House of Assembly of 107 elected members, with ministers responsible to the Colonial Legislature. The suffrage is high, though no distinction is made between whites or natives in the exercise of the franchise. The governor of the Cape also holds the office of Imperial High Commissioner for South Africa, in which capacity he takes a general supervision over the Imperial interests in the different colonies and conducts the correspondence between the Imperial authorities and the two South African republics. He also acts as governor-in-chief over the native territories under Imperial protection or administration.

Cape history begins more than four centuries ago, the native struggles having left no records behind them. Bartolomeo Diaz, a Portuguese, was the first European to sight (in 1486) the Cape of Good Hope, which he named "Cabo de todos los tormentos"—the Cape of all the storms—the more auspicious name it now bears ("Cabo de Buena Esperanza") indicating King John II. of Portugal's well-founded hope that it was the halting-place on a new and easier route to India. But with the exception of a formal proclamation of the country as British, which act of Admirals Fitz-Herbert and Shellinge in the reign of James I. was never recognised as effective, no attempt was made to colonise it until the year 1652, when the Dutch East India Company brought some settlers from Holland. These were increased from time to time by Germans, Flemings, and a few Poles or Portuguese, and in 1686 by a large number of French Protestants, who left their country on the revocation of the Edict of Nantes. The descendants of these people constitute the present "Boer," or "Dutch" population, though the most influential among them are really of French descent. At that time the country was occupied for only a little distance around Cape Town, and was looked upon less as a colony than as a station for the supply of ships. The government was a monopoly of the narrowest, most oppressive description, and to the irksome restrictions then put upon private enterprise has been traced that dislike to all regular government, and that love for "trekking" beyond its influence which, though less marked among the modern Boers, existed long before the British rule began. The natives were either driven from their lands or reduced to serfdom, while Malays and negroes were imported as slaves. In 1795, to prevent the colony falling into the hands of the French revolutionists, whose views the discontented settlers shared, the British, at a request of the Stadtholder, took possession of it. In 1802 it was re-ceded to Holland, but on the renewal of the war in 1806 again captured, and in 1815, on the payment of £6,000,000, finally ceded to its present owners. Since that date, the chief events in its history are as follows:—1811–12, first Kaffir war; 1819, second Kaffir war; 1820, four thousand British settlers introduced into the eastern districts; 1829, all natives not slaves declared on the same footing as Europeans before the law; 1834, third Kaffir war; 1835, "trekking" of the Boers beyond the Orange river owing to the emancipation of slaves in the colony, and the founding of Natal and the "Free" States; 1846, fourth Kaffir war, and extension of colonial boundary to the Kei river; 1853, introduction of representative government arising out of the agitation against the dispatch of convicts to South Africa, though these were never actually landed; 1857, the suicide of 50,000 Amaxos owing to the spread of a religio-political fanaticism, and the resettlement of their country by 2,000 members of the German Crimean legion, and other colonists from Prussia and Mecklenburg; 1865, British Kaffraria annexed; 1867, diamonds discovered in Griqualand West; 1871, Griqualand West proclaimed a colony; 1872, introduction of responsible government; 1877–8, Gaeka and Gealeka rebellion; 1879–81, Basuto war; 1880, amalgamation of Griqualand West with the Cape; 1883, separation of Basutoland from the colony; 1884, establishment of German Protestants over Great Namaqualand, and the country north of the Orange river, with the exception of Walfisch Bay, annexed to the colony; 1887, incorporation of the Transkeian territories (except most of Pondoland); 1889, Customs union between Cape and Orange Free State, and extension of railway from Orange river to Bloemfontein; 1890, new government with Mr. Rhodes as premier, and an expedition from the

Cape to Mashonaland, etc.; 1895–6, Jameson raid and resignation of Mr. Rhodes; 1898, new government, with Mr. Schreiner as premier; 1899, outbreak of the war between Great Britain and the South African Republics, in which Cape Colony decides to remain neutral; 1900, new government under Sir Gordon Sprigg formed; 1901, colony still invaded by the Boers; martial law proclaimed throughout the colony; 1902, death of Mr. Rhodes; 1903, visit of Mr. Chamberlain; 1904, Dr. Jameson, premier; 1908, Mr. Merriman, premier.

Cape of Good Hope, THE, is the name given to the extremity of the promontory that stretches into the South Atlantic from the S.W. corner of the African continent. The length of the peninsula, which has False Bay on the E. and the open ocean on the W., is about 20 miles. Simon's Bay, with the thriving port of Simon's Town, is on its E. coast. The rock that forms the Cape is 1,000 feet high.

Cape Haytien, or HAITIEN, a port on the N. coast of the Island of Hayti, West Indies, situated on a small bay at the foot of a range of mountains. Originally founded by the Spaniards, it was colonised by the French early in the eighteenth century. It has suffered greatly from the various revolutions since the outbreak of Toussaint l'Ouverture in 1791, was almost destroyed by an earthquake in 1842, and was bombarded by the British in 1865. It still does a considerable trade with the United States, and is an administrative centre under the republican government of the island.

Cape Horn, or HOORN, so named from his birth-place by Schouten its discoverer, is the most southernly point of America, being at the extremity of the last island of the Fuegian Archipelago. It presents a black, steep, frowning face to the stormy Southern Ocean, and has always borne a bad name amongst sailors. Steam has reduced the difficulty of doubling it, but heavy seas and strong cold gales prevail in its neighbourhood.

Cape River, or VAUNKS, also known as the COCO or SEGOVIA, a river in Central America, which for the greater part of its course of 300 miles forms the boundary between Honduras and Nicaragua. It discharges itself into the Caribbean Sea at Cape Gracias a Dios, and is navigable for a considerable distance.

Cape Town, the capital and seat of government of Cape Colony, is situated in the angle of Table Bay and to the N. of Table Mountain, on the N. coast of the peninsula that terminates in the Cape of Good Hope. It is surrounded by lofty crags, and through the valley in which it stands the Zoeta or Sweet river flows down to the sea. Founded in 1652 by Van Riebeeck, the older houses display the characteristics of Dutch architecture, but there are numerous fine modern buildings, chief among them being government house, the houses of parliament (opened in 1885), the post office, public library, exchange, art gallery, the courts of law, South African college, Anglican and Roman Catholic cathedrals, university, etc. etc. There are also botanical and public gardens. The observatory, which is in high repute among astronomers since Herschel's time, stands just outside the town, which now possesses all modern improvements, such as gas and electric lighting, ample water supply, and tramways. The harbour, strongly fortified, is rendered secure from the heavy swell of the Atlantic by a magnificent breakwater. Railways connect the town with Port Elizabeth to the east, and Kimberley to the north, and are being rapidly extended into Mashonaland. The chief exports are copper, wool, wheat, diamonds, gold, and wine, the latter being produced in the suburban villages of Constantia, Wynberg, Rondebosch, and Claremont. Pop. (1904), 77,668.

Cape Verde (Port. *Cabo Verde*, Green Cape), the most westerly point of the African coast, lies between the Senegal and Gambia rivers in lat. 14° 43′ N., long. 17° 34′ W. The name was given to it by Portuguese discoverers owing to the cluster of tall baobab trees that crown the headland.

Cape Verde Islands, a volcanic group of ten islands lying in the Atlantic about 320 miles W. of the Cape from which they are named. They are ten in number, Santiago being the largest, Boa Vista the nearest to the coast, and Santa Vicente the residence of the British consul. They were discovered in 1441 by the Portuguese, who established a colony in 1499, and now use it as a penal settlement. The population consists largely of African blacks and half-breeds, the slave system having prevailed as late as 1854. The climate is hot in summer, unhealthy after the periodic rains, subject also to occasional visitations of the Harmattan and also to disastrous droughts. Cattle breeding is the chief industry, and numbers of pigs, goats, mules, and asses are reared. Fish abound on the coast. Orchil is a valuable product, as are coffee, indigo, sugar, and tobacco. Every variety of tropical fruit and vegetable can be grown successfully, but the inhabitants are improvident and idle. Timber is almost entirely wanting.

Cape Wrath, on the coast of Sutherlandshire, forms the N.W. extremity of Scotland. It is a bold pyramidal headland of gneiss 300 feet high, and bearing a lighthouse which is visible for 27 miles.

Capel, HON THOMAS BLADEN, youngest son of William, fourth Earl of Essex, was born in 1776 and entered the navy in 1782, though he does not appear to have actually gone afloat until 1792. He was a midshipman in the *Sans Pareil*, 80, in Lord Bridport's action on July 23, 1795, and was made a lieutenant in 1797. In this latter capacity he was Nelson's signal officer in the *Vanguard*, 74, at the Battle of the Nile. In December of the same year (1798) he was advanced to post-rank. At the Battle of Trafalgar he commanded the *Phœbe*, 36. At the passage of the Dardanelles in 1807 he commanded the *Endymion*, 40, and four years later he was given charge of a small squadron which rendered good service against the Americans. He was nominated a C.B. in 1815, and in 1821 became captain of the *Royal George*, yacht, in which, and in the *Apollo*, another royal yacht, he remained until, in 1825, he reached the rank of rear-admiral.

In 1832 he was promoted to be a K.C.B., and from 1834 to 1837 he commanded in the East Indies. He became vice-admiral in 1837, and full admiral in 1847, and died in 1853. He was the last survivor of the captains who had been present at Trafalgar.

Capelin (*Mallotus villosus*) a smelt-like fish, some 9 in. long, the only species of its genus, found near Kamtschatka and Arctic North America. Its home is on the sea-bottom, but it comes to surface in enormous numbers to spawn. The Capelin, which is one of the most important baits used by the Newfoundland fishermen, is eaten fresh by the Kamtschatdales, or dried for winter consumption.

Capell, EDWARD, born at Troston, Suffolk, in 1713, was appointed inspector of plays through the Duke of Grafton's influence. He expended enormous labour on the revision of the text of Shakespeare, and published an edition with a quaint introduction. After his death appeared *The School of Shakespeare*, in which, besides a mass of textual criticism, there is a good deal of information as to the sources from which the plots were derived. He died in 1781.

Capella, a reddish star of the first magnitude, in the constellation Auriga. This and Vega are the two brightest stars in the northern hemisphere, but it is difficult to distinguish which of these two is the more luminous, on account of the difference in their hues.

Capella, MARTIANUS MINEUS FELIX, a native of North Africa, who probably lived at the end of the fourth or beginning of the fifth century A.D., and composed a strange allegorical work entitled *Satyra de Nuptiis Philologiæ et Mercurii*, which is an encyclopædia of all the knowledge of his day, and contains a remarkable foreshadowing of the Copernican system of astronomy.

Caper, the flower-bud of *Capparis spinosa* and of some allied species belonging to the order *Capparidaceæ*. The plant is a scrambling shrub with spinous stipules and showy flowers remarkable for their very long gynophore (q.v.). It is grown throughout southern Europe, the buds, pickled in vinegar, being imported from Sicily, Italy, and France. The unripe fruits of the garden nasturtium (*Tropæolum majus*) are used as a substitute.

Capercaillie, CAPERCAILZIE (*Tetrao urogallus*), the Cock of the Woods, or Wood Grouse, the largest of the European game birds, and highly esteemed for the table. It is found in fir woods in the mountainous districts of Europe and the north of Asia, and was formerly native to Ireland and Scotland, but in both these countries it was exterminated towards the close of the eighteenth century, and no specimen of either of these races is to be found in any museum. These birds have, however, been reintroduced into Scotland, and they are now fairly plentiful in the Highlands. The male is about the size of a turkey, and has the tail rounded, the feathers of the head elongated, and a scarlet patch of naked skin above the eye. The general plumage is chestnut-brown irregularly marked with black, breast black with metallic green lustre, under surface black. The hen is smaller, and is sandy-brown, barred and variegated with black. The males are polygamous, and in spring show off before the hen birds. The nest is a mere hole, and usually contains from ten to twelve eggs, which are pale yellowish, tinged with red and mottled with brown. These birds feed on the leaves and shoots of the Scotch fir; the young prefer worms and insects. They run into many varieties, and breed freely with allied species.

Capernaum (Heb. *Village of Nachum*, or *Field of Repentance*, or *City of Comfort*), a town on the W. shore of the Lake of Gennesareth, on the borders of Zebulun and Naphtali. It was the chief residence of Christ when He began His mission, and was specially denounced by Him for unbelief. Archæologists identify the modern Tel-Hum as its site, though some prefer the ruins at Khan-Miniyeh.

Capet, the name of a family that for nine centuries played a leading part in French history. Robert the Strong was a Saxon vassal of Charles the Bald, and in the middle of the ninth century received the duchy of the Ile de France. From him descended Hugh the Great, Count of Paris and Orleans, Duke of France and Burgundy, Hugh, the son of this last, was elected king by acclamation, to the exclusion of the Carlovingians, in 987, and by judicious policy he and his successors founded a dynasty that lasted in the direct line to the death of Charles IV. in 1322. The House of Valois that then succeeded was merely a branch of the Capet family springing from Philip the Bold (1270–1285), whose younger son Charles was the father of Philip VI. The Bourbons, who carried on the monarchy up to its extinction, arose from the marriage of Robert, sixth son of Louis IX. (1226–1270), with Beatrice of Bourbon.

Capgrave, JOHN, was born at King's Lynn, Norfolk, in 1393, and after studying at Cambridge and graduating at Oxford became a priest. He then joined the Augustinian priory in his native town and there spent most of his life in literary labours. His great work is *The Chronicle of England*, carried up to 1417 and full of valuable matter. His *Nova Legenda Angliæ* was printed by Wynkyn de Worde in 1516. The *Liber de Illustribus Henricis* is an interesting historical fragment. Most of his other books are on ecclesiastical subjects. He died in 1464, having served as provincial of his order.

Capias, in English law, a writ directed against the person, commanding his or her arrest. There are several writs bearing this title, as

1. *Capias ad audiendum judicium*, which issues against a defendant who is at large when a verdict of guilty is found on a criminal charge, and is for the purpose of bringing him up to receive judgment.

2. *Capias ad respondendum*, which is issued for the arrest of a person against whom an indictment for misdemeanor has been found in order that he may be arraigned.

3. *Capias ad satisfaciendum*, or *ca. sa.*, for the arrest of a defendant in a civil action; since the abolition of imprisonment for debt writs of ca. sa. are now rare, but the writ *when executed* still operates as a satisfaction of the debt, and no

other writ of execution can be sued out upon the same judgment against the defendant's goods or lands, unless he die in confinement or escape from custody.

4. *Capias extendi facias*, a writ of execution issued against a debtor to the Crown, commanding the sheriff to take or arrest the body, and "cause to be extended" the lands of the debtor.

5. *Capias ut lagatum* is a writ for the arrest of an outlaw. Outlawry having been abolished in civil cases, it is now applicable only to criminal process.

Capillaire, a syrup prepared with the maidenhair fern, *Adiantum capillus-veneris*, the French name for which, alluding to its slender black stalks, is *Capillaire de Montpellier.*

Capillaries, the network of tubes which communicate on the one hand with the ultimate arterioles, and on the other hand with the smallest branches of the veins. The diameter of a capillary vessel varies in different parts of the human body; some are barely large enough to enable a single red blood corpuscle to traverse them, as in parts of the brain; elsewhere, as in the skin, the capillaries are considerably larger. In some organs the meshes of the network have an elongated form, as in muscle, while in the alveoli of the lung, and in glands, a rounded form prevails. The closeness of the network is in direct correspondence with the vascularity of the part. The walls of a capillary are composed of a single layer of flattened cells, endothelium (q.v.), and permit of the ready interchange of materials between the blood and the tissues.

Capillarity (from *capillus*, a hair) is the cause of various phenomena of *surface tension*, and exhibited by the behaviour of liquid in fine, hair-like tubes. To explain the nature of surface tension, it must be understood that the particles of a body exert considerable force of attraction on one another, but only at very minute distances. Thus a molecule of water in the middle of a glassful of that liquid is acted on by the mass of congregated molecules in its immediate vicinity, only those enclosed in a very small sphere round the specified particle having any appreciable effect on it. From the symmetry of the arrangement it is clear that there is no resultant pull on the particle in any one direction. But a molecule of water on the surface of the liquid is only acted on by a hemisphere of molecules of water in its neighbourhood, and these exert a resultant pull on the particle at right angles to the surface. It is true there is also a hemisphere of particles of air acting on the molecule of water, but their action is not so great. Consequently we see that all the particles on or near the surface are pulled downwards and therefore cause the surface to act as a sort of elastic membrane or skin, with the important difference that, however extended the surface may be, the force of attraction, or *surface tension*, is always the same per unit length. Thus the surface of a liquid will assume a definite form, the tendency being to minimise its area as far as circumstances permit. A raindrop falling through air, or a soap-bubble floating in it, will assume the spherical form, the surface of a sphere being less than that of any other solid of the same volume. At the edge of the glass of water, where we have glass, water, and air meeting, the three sets of forces draw the surface up the side to a slight extent. If a glass tube of very fine bore be put vertically in the water, the liquid is drawn up the tube to a definite height, and its surface is markedly concave upwards. If mercury be the liquid used instead of water, opposite effects will be seen, the level of the mercury inside the tube will be lower than that outside, and its surface will be convex upwards. Much may be explained concerning the behaviour of oil on "troubled waters," the motion of sap in plants, the formation of clouds, the shapes of the heavenly bodies, and concerning other physical subjects, by the study of capillarity.

Capistrano, GIOVANNI DI, was born at Capistrano in the Abruzzi in 1386. After a short experience of the law he became a Franciscan friar, and won great fame as a preacher. Nicholas V. sent him to Germany in 1450 to oppose the heretical followers of Huss and to raise a crusade against the Turks. He was partly successful in the first object, and though he failed in the second, he died whilst leading a final sortie from Belgrade against the infidel besiegers in 1456. He was canonised in 1690.

Capita, DISTRIBUTION PER. In the administration of the personal estate of a person dying *intestate* (that is, without leaving a will) the claimants, or the persons who are legally entitled to such personal estate, are said to take *per capita* when they claim in *their own rights* as in equal degree of kindred, in contradistinction to claiming by right of representation or *per stirpes*, as it is termed. For instance, if the next of kin be the intestate's three brothers, A, B, and C, here his effects are divided into three equal shares, and distributed *per capita*—one share to each; but if A (one of them) had died previously, leaving three children, and B (another brother) had also died leaving two children, then the distribution would be by representation or *per stirpes* as it is termed —one-third would have gone to A's three children, another third to B's two children, and the remaining third to C, the surviving brother.

Capital, in *Political Economy*, either "that part of a man's property which he expects to afford him a revenue" (Adam Smith), or more strictly, wealth saved and set aside to produce future wealth. In the latter sense it is divided into *fixed capital* (machinery, tools, and buildings) and *circulating capital* (raw material, coal, food of labourers, or the wages paid them instead). Both kinds are consumed in producing (the difference being that the consumption of the second is much more rapid than that of the first), and return with a surplus. In *commerce* the capital of a company is the wealth paid up by its members to invest in the business, as in the first sense above. The word is also sometimes used for the whole body of owners of capital, as in the phrase "the conflict of capital and labour."

Capital Account is an account showing the sums received and expended for the capital (properly, the fixed capital, *see* CAPITAL) of a railway or other commercial enterprise. The capital account of a railway should show the sums received from shareholders, borrowed on debentures and otherwise, and the payments for land, works, rolling stock, stations, etc. Repairs should be paid out of revenue, while all extensions and additions to rolling stock, buildings, etc., should be charged to capital. But the distinction is often less precisely drawn. Some American railway companies, for instance, habitually devote part of their revenue to improvements; and on the other hand, the expenses of mere wear and tear have frequently been charged to capital account and covered by borrowing in order to swell the dividends for the half-year.

Capital Punishment is the infliction of death upon offenders by the country or community to which such offenders belong. In olden times the power of life and death was considered to be the natural right of any authority as regarded enemies, or strangers, or offenders. But with the advance of civilisation the right became greatly limited, and is at the present day widely disputed. The ground taken up both by the upholders and the opponents of the system is in many points somewhat illogical. There are those who hold that it is only permissible to kill murderers, and that this right is in that case permissible only by force of a prescript of the Mosaic law. Others hold that society has always the right to get rid of hurtful members, and that by the most expeditious method. It is better, say they, that a murderer or hardened criminal should be finally disposed of than that the community should be burdened with supporting them and guarding them from further mischief. This view is at least logical, and it seems more in accordance with common sense, and more merciful to kill a criminal than to keep him in a lifelong monotonous captivity, where his good qualities, if he has any, are quite useless, and simply add to the public burden. The opponents of the system may be divided into two classes: first, those who hold that society has only the right to punish with a view to a criminal's amendment by remedying the defects of a bad education or surroundings, an amendment which his death makes impossible; and secondly, those who look upon life as so sacred a thing that no one has a right to inflict death upon a human being, and that the society which executes a murderer is only one degree less culpable than the murderer himself. This view is natural in the case of those who look upon death as annihilation, though strangely enough they do not extend the right of living to what they call the lower creation. Few dispute the right of a man to put to death any animal that is in his possession. There is a further class of hysterical people who raise a shriek at any execution more from a tender self-pity, and a desire to spare their own feelings, than from any deeper motive. It is to this class that the words of the French satirist apply, who, when asked to disapprove of the sacrifice of human life for murder, said, "Let the murderers first carry out the principle." Much of our till lately savage code was doubtless owing to our conservative way of following the custom of our ancestors, but it must be noted that the 18th century saw many of the most sanguinary provisions added to the statute book. It remained for the 19th century to abolish most of them, and practically only murder is now punished by death, though nominally other crimes also are so punishable—that is, so far as civilians are concerned. Soldiers and sailors, especially in time of war, may incur the death penalty under the provisions of the Articles of War (q.v.), and it is evident that in such cases, where men's most savage passions are let loose, there must be no half-discipline, and no paltering with offences.

In some countries capital punishment has been entirely abolished, and in some—Belgium for example—it has been practically abolished by the refusal of the head of the State to sign a death-warrant. The United States settle the question severally for themselves. In one it was abolished to be afterwards revived.

As to the method of execution countries differ. In most civilised lands the object is to inflict death as painlessly and quickly as possible, the latest idea being the American one of death by electricity. But though men are killed easily enough accidentally by electricity, science seems hardly yet able to kill them by it deliberately without bungling. Many disgraceful scenes have been avoided in this country by the adoption of private instead of public executions, though many hold that much of the deterrent effect is lost in consequence. But others doubt whether public executions ever had much deterrent effect, thinking that he who murders rarely gives a thought to the probable consequences to himself, since he is under the influence of some strong passion or other abnormal state of mind. It is yet a moot point whether the retention or abolition of capital punishment has any real influence one way or the other upon the amount of crime, unless, indeed, its abolition may eventually lead to an habitual abhorrence of killing, which will end by extending itself to would-be murderers themselves.

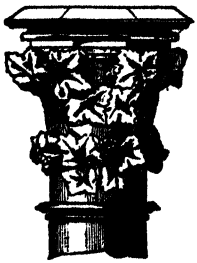
Capitals, in *Architecture*, are the uppermost parts of columns, placed immediately over the shaft

(*a*) Ionic. (*b*) Norman.

CAPITALS.

and under the entablature (q.v.). In classical architecture the Doric, Ionic, and Corinthian orders each have their peculiar capital, the last-named imitated from the acanthus leaf. In mediæval architecture, as well as in Egyptian and Oriental, the capitals are much diversified. In the later

Norman architecture, for instance, they are often ornamented with foliage, animals, figures, etc., while they frequently exhibit foliage in the Early English and Decorated, and more rarely in the Perpendicular styles.



(c) Decorated. CAPITAL.

Capitation Grant, a grant made by the State in aid of primary education, and according to etymology proportioned to the number of scholars brought to a certain degree of efficiency, though practically other considerations come into play. In 1851 the Government grant amounted to £836,920, while the capitation grant was a sum over and above which was granted for special excellence. The Commission of 1861, deprecating the continuance of a scheme which seemed to encourage the pushing forward of a few advanced scholars to the neglect of more backward ones, recommended that the prospects and position of teachers should be made dependent upon the result of a thorough examination of all scholars. Many changes and modifications have since been made. The Act of 1882 graduated the grants, and settled that the withdrawal of weak scholars from examination should not invalidate claims, and gave also a merit grant for general tone. The Commission of 1886 also recommended the further abandonment of the numerical test in favour of a qualitative one.

Capito, CAIUS ATEIUS, a Roman jurist who flourished under Augustus and Tiberius. His undoubted ability and learning were used by the emperors to oppose the necessary legal reforms advocated by Labeo. Hence arose two rival schools of jurisprudence, the Sabiniani or Cassiani, so named from pupils of Capito, and the Proculeiani from Sempronius Proculus, a follower of Labeo. The echo of their disputes was heard for centuries. None of Capito's voluminous writings are extant.

Capito, or KOEPFLIN, WOLFGANG FABRICIUS, was born of humble family at Hagenau, Alsace, in 1478, and became a minister of the Reformed Church, serving as Professor at Freiburg, and Pastor at Bruchsal, Basel, Mainz, and Strasburg. He took a leading part in the controversies of his day, and was deputed with Bucer to lay the Confession of Augsburg before the emperor. His attempts to reconcile the Lutherans and Zwinglians made him an object of suspicion to both. His works were chiefly on the Old Testament and the interpretation of prophecy. He died in 1541.

Capitol, the famous temple to Jupiter, Juno, and Minerva, that occupied the lower of the two peaks of the Capitoline Hill at Rome, the other being crowned by the Arx or Citadel. Romulus first built a temple to Jupiter Feretrius on this spot, but the triple shrine was founded by Tarquin I., built by his son, and dedicated by M. Horatius Pulvillus cons. suff., in 509 B.C. This structure, which lasted till 83 B.C., was built in the Etruscan style of stuccoed peperino with wooden architraves. Sulla began to rebuild it in marble, but it was completed and dedicated by Q. Lutatius Catutus. The Vitellian rioters burnt it down in 70 A.D., and it was reconstructed by Vespasian. Lastly, this building was destroyed by fire under Titus, and a new Capitol was erected by Domitian at fabulous cost. Scarcely any traces of the noble edifice are left, the Palazzo Caffarelli standing on the site. No change was ever made in the plan; three cellæ were enclosed beneath one roof, the central one being sacred to Jupiter, Minerva holding place on his right, Juno on his left. Newly-elected consuls took their vows here, and victorious generals were borne hither in triumph. Many other temples and public buildings were situated on the Capitoline, and the Tarpeian Rock, whence criminals were thrown, terminates its southern extremity. The Campidoglio, or modern Capitol, was designed by Michael Angelo, but is not one of his best works. It serves as a town hall and museum.

Capitularies (Latin *capitulum*, dimin. of *caput*, a head), collections of the laws issued for the whole of the Frankish empire, as distinct from the laws of the separate peoples composing it. The best known of these collections was begun by Charlemagne (q.v.). The name was derived from their arrangement under heads or by chapters. The term is also applied to chapters (q.v.) of canons and to military orders; also to the members individually, and to their statutes.

Capitulation (Latin *capitulum*), an agreement arranged under heads; usually, but not always, dealing with the surrender on terms of a besieged city or vanquished army. CAPITULATIONS are also the set of agreements between European governments and certain semi-civilised powers, in virtue of which the subjects of the former resident in the territory of the latter possess certain privileges, especially that of being subject to the jurisdiction of their own consuls instead of the native courts. Such arrangements exist with Egypt and Japan at the present time, and in the 18th century obtained between France and the Potre.

Capitulum, the name of the free end of a barnacle which is enclosed by the shells; it contains the body and arms. In botany the term is applied to the "head" or compound inflorescence of the *Compositæ* and similar plants.

Capo d'Istria, a fortified port situated on a small island in the government of Trieste and circle of Istria, Austria. The island is connected with the shore by a causeway half a mile in length, and possesses good accommodation for vessels, but little or no trade except in fish, wine, and oil. It is identified with the classical Ægida, and was afterwards named Justinopolis. For some time it was a free commonwealth, and then was conquered successively by the Venetians and Genoese, passing to Austria in 1797.

Capo d'Istria, or CABODISTRIAS, JOHN, COUNT, the son of a physician at Corfu, was born in 1776, and educated for his father's profession. When the Ionian Islands were ceded to France by

the peace of Tilsit, he entered the Russian diplomatic service, and became foreign secretary in conjunction with Nesselrode. After the battle of Navarino he was elected president of the Greek republic, but as his fidelity was suspected, he was assassinated by political partisans at Nauplia, 1831.

Capon, the male of the domestic fowl, castrated that it may fatten better—a common practice, especially in France.

Cappadocia, a country of vague extent in Asia Minor. Herodotus speaks of the Cappadocians as Syrians. They inhabited two distinct satrapies of Persia, the northern one later on being known as Pontus, whilst the inland province, bounded S. by Mount Taurus, E. by the Euphrates, N. by Pontus, and W. by Galatia and Lycaonia, became Cappadocia or Great Cappadocia, being about 250 miles long and 150 broad. The Persian satraps seem to have developed into hereditary kings, the first of whom, Ariarathes I., a contemporary of Alexander, was killed by Perdiccas. The dynasty, however, lasted until Mithridates the Great drove out Ariarathes VIII., who soon after died. The Romans now interfered, and Ariobarzanes was elected to the throne, and remained, as did his son, a staunch ally of Rome. The third of this line was put to death by Antony, and for 50 years Archelaus reigned over an extended kingdom. In 17 A.D. Cappadocia became a Roman province, and in 1074 it was conquered by the Turks. Most of the region, except the valley of the Euphrates, is a lofty, treeless plateau, 3,000 ft. above sea-level, affording pasture to immense flocks. From the midst of this expanse rise Mounts Argæus (Erdjish Dagh) and Hassan Dagh. The chief rivers are the Pyramus (Jihun), the Sarus (Sihun), and the Halys (Kizil Irmak), on which is situated Mazaca or Cæsarea (Kaisariyeh), the capital. Tyana occupied the site now known as Kiz-Hissar, and other towns of some ecclesiastical importance were Nyssa, an episcopal see, and Nazianzus, the birthplace of St. Gregory.

Caprera, or CABRERA, a small island in the Mediterranean, 2 miles from the N.E. coast of Sardinia. It has an area of 6,700 acres, and is rocky and barren. Garibaldi built himself a house there in 1854, to which he retired at intervals during his active life, and in which he spent much of the ten years that preceded his death in 1882.

Capri (classic CAPREÆ), a limestone islet to S. of the Bay of Naples, and 3½ miles from Sorrento. In area 20 square miles, it consists of a fertile inland valley between two lofty plateaux. The coast is difficult of access, being girt with steep cliffs. Capri, the capital, stands on the eastern side, and has a fine cathedral. Anacapri, on the opposite side, crowns Monte Solara, and is approached by a rocky stairway. The island belonged to Neapolis, and its inhabitants still retain the Greek type. Augustus purchased it from the Neapolitans in exchange for the larger island of Aenaria, and lived there occasionally, and Tiberius spent the last ten years of his existence in this retreat. Great Britain held it from 1803 to 1808, and it has always been a favourite resort of the British, owing to the fine air and picturesque scenery. The Blue and the Green grottoes are remarkable for the tints reflected on their walls by the waters of the Mediterranean.

Capriccio, in *Music*, the term applied to a piece of music without any limitation as to form, which may either be entirely original, or may consist of a transcription of another composer's subject. The name was originally given to pieces written in the fugued style, with a bright, lively subject.

Capricorn (Lat. *The Goat*), a constellation of the southern celestial hemisphere, which from its position on the ecliptic was adopted as one of the signs of the zodiac. Its stars are somewhat mixed up with those of *Aquarius*. The Goat appears on the southern meridian in September, and thus gives its name to the *Tropic of Capricorn*.

Capridæ, in some classifications a family of Ruminants, containing the sheep and the goats, as distinct from the cattle and from the antelopes. [BOVIDÆ.]

Caprification (Lat. *caprificus*, a wild fig), a process of facilitating the fertilisation of the fig-flower, practised in antiquity, and still in the Levant. Branches of the wild fig are hung on the cultivated fig, which usually produces only female flowers. These bring with them an insect (Blastophaga) reared in the galls formed in the female flower of the wild fig, which carries the pollen of the male flower of that tree to the female flower of the edible fig, which it thereby fertilises. Botanists, however, have differed as to its utility.

Caprimulgidæ, a widely-distributed family of Picarian birds, of which the goatsucker (q.v.) is the type. [NIGHT-JAR, OIL-BIRD, WHIP-POOR-WILL.]

Capsicum, a genus of small plants belonging to the order *Solanaceæ*, natives of the tropics, valued mainly for their fruits, which have a hot pungent taste owing to the presence of a peculiar acrid alkaloid known as *capsicin*. Small pods called chillies, Spanish pepper, red pepper, and pod pepper, are produced by *C. fastigiatum*, a native of southern India. The larger pods known as capsicums or Guinea pepper, the "poivrons" of the French, are the produce of *C. annuum*, originally native to South America, introduced into Europe by the Spaniards and cultivated in England since 1548. Other species are *C. frutescens*, the spur or goat pepper of the East Indies; *C. tetragonum*, the bonnet pepper of Jamaica; *C. grossum*, bell pepper; *C. cerasiforme*, cherry pepper; and *C. baccatum*, bird pepper. Vinegar in which the fruits have been soaked is known as Chili vinegar, and Cayenne pepper (q.v.) is prepared from the ripe fruits, dried and ground.

Capstan, a cylindrical drum, borne on an axial spindle, and capable of being revolved either by manual power, which is applied by means of capstan bars temporarily applied to holes in the upper part of the drum, or by steam power. The drum, when being revolved, is prevented from slipping back by catches or "pawls," which are generally

fixed on the deck or platform upon which the capstan rests. The object of a capstan is to facilitate the performance of any work which requires extraordinary effort; and capstans are, therefore, always fitted on board ship, where they are especially used for heaving in cable, and for winding up any heavy bodies. The capstan seems to have been introduced into English ships in the time of Queen Elizabeth. Wooden line-of-battle ships carried two capstans—the fore and the main. Modern ships often carry several, which are now generally moved by steam power, and which are of very various designs.

Capsule, a dry, dehiscent, syncarpous, and superior fruit, occurring in many widely-differing groups of flowering plants, and varying considerably in details of structure. It may be one-chambered as in the violets, primroses, and pinks, or many-chambered as in flax, and may have parietal placentation (q.v.) as in violet, central as in flax, or free-central as in primrose. Most capsules split longitudinally into "valves." If this valvular dehiscence takes place down the dorsal sutures or midribs of the carpellary leaves, as in *Helianthemum*, the rock-rose, it is termed *loculicidal*, as each loculus or chamber will be broken into, and each valve will consist of two half-carpels. If the splitting be along the ventral sutures, or lines of junction between carpels, it is termed *septicidal*, and each valve is a carpel. In either of these cases the septa or partitions between the chambers may, as in the thorn-apple, be broken across, when the capsule is called *septifragal*. Some capsules dehisce by teeth, the carpels only splitting apart slightly at the apex, as in primroses and pinks; others open by small holes or pores, as in the poppy and snapdragon. These last have been separated as *pore-capsules;* and those which dehisce transversely, forming a round lid, such as *Anagallis*, the pimpernel, and *Lecythis*, the monkey-pot, have been termed a *pyxidium*. There is little to differentiate the siliqua (q.v.) of the *Cruciferæ* from the capsule, and the name is often extended to the inferior capsular fruit, or *diplotegia*, of *Iridaceæ*, *Campanulaceæ*, etc. In this, however, there is much real difference in development.

Captain, a chief officer. In the army, a commander of a company. In the navy, a commander of a ship. By courtesy, every commanding officer of a man of war is called captain, no matter what may be his rank in the service, but the term is strictly applied only to one having the rank of post-captain; to one, that is, who has passed through the preliminary grades of lieutenant and commander, in either of which grades he is available for the command of vessels of secondary importance. The full pay of a captain in the British navy varies from £410 12s. 6d. to £602 5s. per annum. He may also receive allowances, additional pay, etc., and, if of senior rank, he may be temporarily appointed Commodore (q.v.). A staff captain is a *navigating* officer of the highest rank. A captain of the fleet is an officer, either a captain or a rear-admiral, who is temporarily appointed to act as chief of the staff to an admiral commanding a fleet. Captain is also, in the royal navy, the title of the chief sailor among particular gangs of blue-jackets in a ship. There is thus a captain of the hold, a captain of the main-top, a captain of a gun, etc.

Capua, an ancient fortified city, the capital of Campania, is situated near the river Volturno, 18 miles N. of Naples. It is believed to have been founded by the Tuscans in the ninth century B.C., and soon became exceedingly wealthy and luxurious. The Samnites captured it in 424 B.C., and soon degenerated under its enervating influence, so that Rome had to protect them from the neighbouring tribes. The inhabitants were despoiled by their allies of much of their land, but were admitted to citizenship. In the second Punic war they joined Hannibal, and demoralised his soldiers. The city was then taken by Rome and severely punished, its civic existence being destroyed, and the remainder of its territory converted into Roman public land. This territory, known as the Ager Campanus, is much heard of in the agrarian controversies of the time of Cicero. The city was restored to municipal privileges for fidelity in the Social war. Under Julius Cæsar it became a Roman colony. The Vandals (456) and the Saracens (846) utterly destroyed it, and its site is now occupied by the town of Santa Maria, where the ruins of the great amphitheatre still exist. The modern Capua was founded at Casilinum by a remnant of the survivors of the Saracen assault. It is one of the strongest places in South Italy.

Capuchin (Fr. *capuche*, a cowl), a reformed branch of the Franciscan order, founded in 1526 by Matthew de Baschi of Urbino in 1526. He attempted to restore the original strict rule of the order (as he conceived it) together with the original dress and cowl. The monks were to live by begging, and everything about them was to be poor and mean: even the chalices in their churches were to be of pewter. The founder himself withdrew from the order, and their third Vicar-General, Bernardino Ochino, married and became a Protestant, and eventually a Socinian and an advocate of free divorce. In consequence of this they came very near forcible suppression by the Pope. Abolished in France and Germany at the end of the 18th century, they revived, but were again suppressed in both countries in 1880. There are still several thousands, mainly in Austria and Switzerland. In England it has five monasteries; there are two in Wales, and three in Ireland.

Capuchin Monkey, a popular name for any species or individual of the genus Cebus, ranging from Costa Rica to Paraguay, derived from the fact that the disposition of the hair round the face somewhat resembles the hood of a Capuchin friar. They are small in size, lively and affectionate, and possessed of considerable intelligence. Rengger taught one which he kept as a pet to open nuts by breaking them with a stone. *C. albifrons*, *C. fatuellus* the Brown, and *C. capucinus*, the Weeper Capuchin, are the best known of the eighteen species.

Capulets, THE, a Ghibelline family of Verona, whose feud with the rival house of the Montagus has become famous through Shakespeare's tragedy of *Romeo and Juliet*, and through Dante's reference to it in the 6th book of his *Purgatory*. The quarrel, if it has any historical basis, must be traced to the early part of the fourteenth century.

Capybara (*Hydrochœrus capybara*), sometimes called the Water-hog, a semi-aquatic rodent of the guinea-pig family from the north and east of South America. It is the largest living member of the order. Some that Darwin shot were over 3 ft. long. He says that "from their manner of walking, and colour, they resemble pigs; but when seated on their haunches . . . they reassume the appearance of their congeners, cavies and rabbits." Their skins are of trifling value, and the meat is very indifferent.

Carabobo, a state of the republic of Venezuela, S. America. It has an area of 8,080 square miles, and produces coffee, tobacco, indigo, wheat, and cotton. Valencia, the capital, stands 85 miles S.W. of Caracas. The chief port is Puerto Cabello.

Caracal (*Felis caracal*), a lynx-like cat from Africa and the warmer parts of Asia. The upper surface is reddish-brown, the under parts paler, and occasionally white. Some specimens are partially spotted, and in all the tail (some 9 in. or 10 in.) is tipped with black; the ears are tufted, and about 3 in. long. Total length from 35 in. to 40 in. In India the caracal is trained to hunt small game.

Caracalla, MARCUS AURELIUS ANTONINUS, the son of the Emperor Septimius Severus, was born at Lyons in 188 A.D. His true name, Bassianus, was dropped for Caracalla on account of the hooded tunic which he wore and introduced into the army. He was also nicknamed Tarantus. He endeavoured to assassinate his father, and on succeeding to the purple in 211, murdered his brother Geta in the presence of his mother. He also put to death some 20,000 people supposed to be adverse to his rule. His life, happily short, was one succession of insane excesses committed in his progresses through all parts of the empire. He married his mother-in-law, and then devastated Mesopotamia because the king refused him his daughter. Alexandria was subjected to a fearful massacre on account of his sarcastic reception by the people. He was at last killed at Edessa (217) by one of his guards, Macrinus, who usurped the throne.

Caracara, the Brazilian name for *Polyborus braziliensis*, from its cry; applied also to the other species of falcon-like hawks of the sub-family Polyborinæ, exclusively South American, with the exception of the Secretary-bird (q.v.). The toes of these birds are webbed at the base, and they seem quite as much at home on the ground as in the air. They feed on frogs, small reptiles, offal, etc. The plumage is brownish-grey with darker markings, and the bare pale skin of the face becomes red when the birds are irritated or excited.

Caracas, or CARACCAS, a city of South America, capital of the United States of Venezuela, is situated at an altitude of nearly 3,000 feet above sea-level in lat. 10° 31′ N., and long. 67° 5′ W. It is regularly built, with well-paved and spacious streets; and among its chief edifices are the cathedral, university, federal palaces, and other official buildings. In the cathedral is the tomb of Bolivar. Public parks and gardens are numerous, and it is well provided with educational and charitable institutions. It is subject to earthquakes, and in 1812 as many as 12,000 people are said to have perished in this way, while a great part of the city was destroyed.

Caracci, or CARRACCI, AGOSTINO, painter, was born in 1558 in Bologna. A pupil of his cousin, Ludovico (q.v.), he yet paid more attention to engraving than to painting, and as an engraver he takes a high place in Italian art. His painting of the *Communion of St. Jerome* is justly celebrated, and shows to what eminence he might have risen had he cultivated the art. He died at Parma in 1601, just as he was completing his great painting of *Celestial, Terrestrial, and Venal Love*.

Caracci, ANNIBALE, brother of the preceding, was born in 1560 in Bologna. *St. Roch distributing Alms* was the first picture to confer fame, and he was in consequence employed to paint the Farnese gallery at Rome. The series of frescoes he here painted is considered his greatest work. Among his easel-pictures the chief is the *Three Marys wailing over Christ*, now possessed by the Earl of Carlisle. He died in 1609 at Rome, being buried near to Raphael's tomb in the Pantheon.

Caracci, LUDOVICO, painter, cousin of the two preceding, was born in 1555 at Bologna. While studying under Tintoretto at Venice he acquired the reputation of being a dunce. After a careful study of preceding masters, he became imbued with principles antagonistic to the art then prevailing in Bologna, and to promote these principles established a school under the name Incamminati, or the "Right Road." With him were associated his cousins, Agostino and Annibale, and so successful was the project that every other school of art in Bologna was deserted and closed. He died in 1619. Among the works of Ludovico still preserved at Bologna are *Madonna and Child throned*, *Madonna and Child standing*, *Transfiguration*, etc.

Caraccioli, PRINCE FRANCESCO, a distinguished Neapolitan naval commander, was born about 1729, and, after having bravely served his sovereign and country, joined the Parthenopean republic, and for a short time was commander-in-chief of its fleet. Upon becoming convinced that the King of Naples would recover his throne, he endeavoured to secrete himself, but, being discovered, was carried on board Lord Nelson's flagship, which was then engaged in protecting royalist interests. The unfortunate prince was at once tried by court-martial, and the same evening was hanged at the yard-arm of the Sicilian frigate *Minerva*. This was on June 29th, 1799. Lord Nelson has been accused of having unduly hurried the proceedings, and of having

acted unjustifiably throughout; and it must be admitted that the circumstances attendant on the prince's execution constitute a blot upon the memory of our greatest admiral. At the same time it is impossible to suppose that Nelson realised that he was doing wrong. The indignation of the loyal sailor seems to have got the better of the natural humanity of the kindly man.

Caractacus, or CARADOC, king of the ancient Britons, fought against the Romans during the period 43 to 50 A.D. At length overcome, he fled to Cartismandua, Queen of the Brigantes, who betrayed him; and in 51 A.D. he was led in triumph through Rome by the Emperor Claudius. His dignified demeanour so impressed the emperor that he was pardoned, but according to tradition died at Rome 54 A.D.

Caraffa, CARLO, nephew of Pope Paul IV., was born in 1517. Made cardinal by his uncle, he was banished from Rome for extortion, and in 1561 executed by Pope Pius IV.

Caramel, a dark brown bitter substance, obtained by heating sugar to about 200° C.

Carancaway, a large Texan tribe formerly ranging along the coast from Galveston Island to the Rio Grande del Norte; said to have been cannibals, and noted for their great stature, averaging 6 ft., were reduced to forty or fifty in 1843, when they migrated to Tamaulipas in Mexico, and are now probably extinct. (*See* A. R. Roessler in *Smithsonian Report* for 1881.)

Caranx. [HORSE-MACKEREL.]

Carapace, (1) a term applied to the hard covering of the ARTHROPODA. It is composed of a series of layers containing hard bands of phosphate of lime, chitin, etc.; in some cases, as in the crab, the carapace is composed only of one piece (the cephalothorax), formed of the skeletal elements of many somites fused together; or it may be bi-valved, as in some Entomostraca. The carapace is usually thrown off periodically by a process of moulting, known as "ecdysis." The carapace differs from shell in microscopic structure as well as in composition. (2) The dorsal or upper half of the "shell" of a Turtle or Tortoise. The lower half is called the Plastron.

Carat, as applied to gold, is used to mean simply $\frac{1}{24}$th part by weight of the substance. Thus 18 carat gold signifies that the article consists of $\frac{18}{24}$ths, or 75 per cent. pure gold. The gold used in our current coinage consists of 91·66 pure gold, or 22 carats. The carat as used for weighing precious stones differs in different countries, but for diamonds, a convention of the diamond merchants of London, Paris, and Amsterdam agreed in 1877 that the carat, equivalent to 4 diamond grains, should be 205 milligrams, and should be divided by 4ths, 8ths, 16ths, and so forth. The tiny platinum weights used by diamond merchants are some of them hardly more than a film. The word, of Greek origin through Arabic, originally denoted a kind of seed.

Caravaca, a town of Spain in the province of Murcia, is situated on a stream of the same name in a rich wine district. It has the ancient castle of Santa Cruz, and has manufactures of woollens, oil, paper, and leather.

Caravaggio, MICHEL AMERIGHI DA, painter, was born in 1569 at Caravaggio, Lombardy, whence he received his name. His father being a mason, employed him as a labourer, but he zealously worked as a painter and won the patronage of Cardinal del Monte. The distinctive feature of his work was the contempt it displayed for idealism of any kind, and he became the head of the naturalists' school. He was of a violent disposition, which led him into continual trouble, being obliged to flee from Rome on account of a manslaughter committed in a gambling quarrel. He sought refuge in Malta, where he again got into trouble. Escaping thence he was seized with a violent fever, brought on by wounds and exposure and, lying down on the beach at Porto Ercole, died in 1609. Among his leading pictures are *The Fraudulent Gamblers*, *The Burial of Christ*, *Christ and His Disciples at Emmaus*, in the National Gallery, and *St. Sebastian.*

Caravaggio, POLIDORO CALDARA DA, painter, was born towards the end of the fifteenth century, and assisted Raphael on the Vatican frescoes. *The Crucifixion* and *Christ bearing the Cross* are his most famous pictures. In 1543, while on his way from Messina, where he had amassed a considerable fortune, he was robbed and murdered by his assistant, Tonno Calabrere.

Caravan (Persian *kār*, business, and Arabic *kair*, trade) denotes a company of merchants of the East, who combine together for mutual company and protection while travelling from place to place with their goods. The practice is of ancient date, and mention is made more than once of such travelling in the Bible. For instance, the company to which Joseph was sold by his brethren was just such a caravan as may be met with at the present day. The head of the caravan is called a Reis, and has considerable power. The caravanserai, or inn where at certain spots a caravan halts for the night, consists of a courtyard for the camels surrounded by buildings for sheltering the men, and is only an inn in the sense of providing shelter. For food the caravan is self-dependent. The word caravan has been applied in modern times to vehicles in which the travellers live. "Van" is the same word shortened.

Caraway, the half fruit or mericarp (q.v.) of the umbelliferous *Carum Carni*, commonly miscalled a seed. The plant is a native of northern and western Asia and northern Europe, and is cultivated in Kent and Essex, occurring also as an escape. It has a fusiform root, finely-cut leaves, compound umbels with not more than one bract, white flowers of which the outer ones are larger, and an oblong fruit. The mericarps have each five ridges and conspicuous oil-cavities. They have an aromatic odour and a spicy taste, from the presence of from three to six per cent. of a volatile oil, a mixture of the stearoptene *carvol* and *carvene*. This oil is

extracted by distillation and is used in medicine as a carminative and as a flavouring ingredient in liqueurs and confectionery. It is more abundant when the plant is grown in northern regions. Whole caraways are also largely used in cookery, and about a thousand tons are imported into England annually, mainly from Holland.

Carbamide. [UREA.]

Carbamines, also called *isocyanides*, or *isonitriles*, are a class of organic compounds, of the composition X.N.C. where X is any hydrocarbon radical, as methyl, ethyl, etc., *i.e.* CH_3, C_2H_5, etc. They are volatile and poisonous, with a disgusting odour, and form a large class of chemically-important substances.

Carbazotic Acid, also called PICRIC ACID, or TRINITROPHENOL $C_6H_2(NO_2)_3OH$, is a yellow, crystalline, soluble substance, prepared by the action of nitric acid on phenol. It is used in microscopic work for the purpose of staining objects. Its salts readily explode by concussion or heat; *ammonium picrate*, $C_6H_2(NO_2)_3ONH_4$, is largely used in the manufacture of explosives.

Carbine, a short-barrelled musket or rifle suitable for use by cavalry. As regards calibre, breech-apparatus, etc., the modern carbine is similar to the corresponding modern rifle; but it has less power and range, since the reduced length of barrel does not permit of the complete combustion of the powder charge. The weapon has given its name to a certain type of cavalry—the Carbineers.

Carbohydrates are a class of closely-related substances, all consisting of carbon, hydrogen, and oxygen, the two latter elements being present in the proportion in which they exist in water. Under this head are included amongst others the sugars, grape sugar, cane sugar, milk sugar, etc.; starch, dextrin, cellulose, gums, etc. They are frequent constituents of plants (starch, cellulose, etc.), and animal products (glycogen). Many have recently been synthetically prepared, and their constitution shown to be analogous to *aldehydes* or *ketones*. Almost all exert an action on polarised light, and most undergo fermentation by the action of different micro-organisms, the products varying with the carbohydrate and with the organism employed.

Carbolic Acid, also known as PHENOL and CREASOTE, is a hydroxy derivative of Benzene (q.v.) of composition C_6H_5OH. It is chiefly obtained from heavy coal-tar oil (BENZENE, COAL TAR) by treating with soda, and then adding an acid to the soda solution. When pure it forms colourless needles, melting at 42°, but it soon becomes coloured. It has weak acid properties, a characteristic odour, a burning taste, and is poisonous.

Carbolic acid is extensively employed as an antiseptic and disinfectant. The surgeon uses it for cleansing instruments and sponges, and as a stimulating and antiseptic lotion in the treatment of ulcerated surfaces. If applied to infected matter with the object of destroying germs, the solution must be of suitable strength. As ordinarily employed, carbolic acid is often well-nigh useless. It is a common practice to add a small quantity of a 5 per cent. solution to a large volume of noxious material, the resulting strength of the mixture being absurdly insufficient for the production of the germicidal effect which it is desirable should be obtained. Carbolic acid is but rarely administered internally; it has, however, been employed in small doses in fevers. It is sometimes accidentally swallowed and gives rise to symptoms of irritant poisoning; it may be absorbed from wounded surfaces, and in such cases a peculiar discoloration of the urine has been noted (carboluria).

Carbon (atomic weight 11·97) is a non-metallic elementary substance, which occurs very abundantly and is widely distributed. It occurs free in three different modifications [ALLOTROPY], viz. as diamond, graphite, and charcoal. All organic matter contains carbon combined with other elements. It occurs combined with hydrogen in many mineral oils or petroleum, etc. Combined with oxygen it is found in the atmosphere and volcanic gases. In combination with oxygen and magnesia, or lime (dolomite and limestone), it forms a large portion of the earth's crust. The *diamond* is the purest form of carbon. It is found chiefly in South Africa, India, and Brazil. It was proved to consist solely of carbon by Lavoisier, who showed that when burnt, carbon dioxide, CO_2, was the only product. It is generally colourless, has a fine lustre, and is the hardest substance known. It crystallises in the regular system, and has a specific gravity 3·5. *Graphite* occurs in the United States, Siberia, etc., and in England in Cornwall and Cumberland. It has a specific gravity 2·2, is of a glistening grey-black colour, and leaves a streak on paper. It is hence used for the manufacture of pencils and is known as *black lead* or *plumbago*. Besides its use for this purpose it is largely employed as a lubricant, and for the manufacture of crucibles. It crystallises in hexagonal plates. Charcoal or amorphous carbon is obtained by heating many organic substances in the absence of air. From wood by such a process wood charcoal is obtained. It is very porous, and can absorb many gases. *Animal charcoal* or *bone black* (q.v.) is obtained similarly from bones. *Lamp black*, an impure carbon obtained by the imperfect combustion of oil, etc., is largely used as a pigment. *Gas carbon* is a very hard variety left in gas retorts after heating coal for the production of illuminating gas. All these latter forms are more or less impure, containing variable quantities of ash, etc. The different varieties of coal all consist chiefly of carbon, the quantity varying from about 70 per cent. in brown coal to about 97 per cent. in anthracite. Carbon burns in air forming carbon dioxide, CO_2. Another oxide also exists—carbonic or monoxide (q.v.), CO. With hydrogen and oxygen, etc., it forms a very large number of compounds of every variety of chemical and physical character. The chemistry of the carbon compounds on this account is regarded by itself as a branch of the science, and commonly called *organic chemistry*.

Carbonado, or CARBONATE, is an opaque, black diamond found in Brazil, of extreme hardness, and used on that account for boring rocks and for smoothing the surfaces of grindstones and emery-wheels.

Carbonari, the Italian word for colliers or charcoal-burners, was the name given to a secret society which existed in Italy and France in the early part of the 19th century. It was first formed in the fastnesses of the Abruzzi, and gave much trouble to Murat, whom its members hated almost as much as they did Ferdinand. They took their principles and ritual partly from freemasonry and partly from Christianity, and gave to their meetings the names of *baracca* (hut), *vendita* (sale), and *alta vendita* (big sale), in ascending order of importance. In 1820 their numbers are said to have mounted to several hundred thousands, Charles Albert of Sardinia, Lord Byron, Silvio Pellico, and Mazzini being among their number, but their power was broken by Austria, and in 1831 they were absorbed by Mazzini and the "Young Italy" movement. The establishment in France was organised in 1820, Lafayette being the moving power, the members calling themselves *bons cousins*, and speaking of outsiders as *pagani*. Their meetings were *ventes particulières*, *ventes centrales*, *hautes ventes* and *ventes suprêmes*. They were careful to possess no documents. After an unsuccessful rising in 1821, they took part in the revolution of 1830, and by 1848 they had almost ceased to exist.

Carbonic Acid is used to signify both the gas carbon dioxide CO_2, and its compound with water H_2CO_3. The gas occurs in the atmosphere to the extent of about ·04 per cent., and is found in volcanic gases. It is always produced when carbonaceous substances burn in air or oxygen. It is one of the waste products of the animal economy, and hence occurs in expired air. Green plants, however, under the influence of sunlight, decompose the atmospheric CO_2 with elimination of the oxygen. It is also generally a product of fermentative action. It may be prepared by the action of an acid upon a carbonate, as chalk or marble. The action is represented by the equation $CaCO_3 + 2HCl = CaCl_2 + OH_2 + CO_2$. It is a colourless gas with a peculiar odour. It is heavier than air (density 1·52). By cold and pressure it may be liquefied, or solidified to a white snow-like mass. Though not really poisonous it is non-respirable, and if present to the extent of 2 or 3 per cent. renders air suffocating. Lighted tapers immersed in it are at once extinguished. It is soluble in water, and water charged at high pressure gives off the gas at ordinary pressure with effervescence, *e.g.* sodawater, champagne, etc. Its solution in water has weak acid properties, and may be regarded as containing an acid H_2CO_3, the salts of which are known as *carbonates* when both hydrogen atoms are replaced by a metal, as $CaCO_3$, and *bicarbonates* when only one is so replaced.

Carboniferous System, a great series of Palæozoic rocks named from the occurrence of coal (q.v.) in its upper portion, reaching sometimes a thickness of 20,000 feet. It generally passes conformably downwards into the underlying Old Red Sandstone, and in Bohemia, at Autun in France, and elsewhere, it passes conformably upward into Permian rocks. Carboniferous rocks seem mostly to have accumulated in the sea not far from land, or in lagoon swamps that have been compared to the mangrove swamps of the present day. The close of the Devonian epoch would seem to have been marked by great though gradual geographical changes, so that an open sea extended from the west of Ireland to Westphalia, undergoing during the earlier part of the Carboniferous epoch continuous depression, but shallowing towards land to the north of Derbyshire. Subsequently, during the latter part of the epoch, though depression must have continued, at least intermittently, the "lagoon type" of shallower water conditions seems to have extended southward over most of the area occupied previously by the "marine type." In the open sea a very pure limestone, sometimes foraminiferal, sometimes crinoidal, and sometimes coralline, known as the Carboniferous, or, from the scenery it now often forms, as Mountain Limestone, accumulated to a depth in some places exceeding 6,000 feet. The lagoon type, on the other hand, is represented by thousands of feet of sandstone and grit, with occasional conglomerate and shale, with seams of coal (q.v.) resting on beds of fire-clay, and with beds of clay-ironstone (q.v.) nodules. False-bedding (q.v.), ripple-mark, and suncracks tell of the shallow water origin of the sandstones, and the coal-seams mark successive forest-growths during considerable pauses in the sinking of the area. Volcanic activity during the earlier part of the epoch is marked by intercalated rocks in Derbyshire, the Isle of Man, and especially in the south of Scotland, where some sheets reach a thickness of 1,500 feet. In Russia, China, and western North America, Carboniferous rocks cover large areas horizontally, as does the Carboniferous Limestone in Ireland; but in England the limestone forms the axial Pennine anticlinal from Northumberland to Derbyshire, and elsewhere the system is mainly preserved in synclinal basins or "coal-fields," once united but now detached. The limestones contain a rich marine fauna, 1,500 species having been described. They are largely composed of foraminifera, such as *Fusulina*; abound in corals, such as *Lithostrotion*; in crinoids, such as *Platycrinus*; in polyzoans, especially *Fenestella*; in brachiopods, especially *Productus* and *Spirifer*; and in pelecypods; and contain the blastoid *Pentremites*, numerous gastropods, pteropods, and cephalopods, the last of the trilobites and numerous fish, some of large size, represented by spines and teeth like those of rays or sharks. The flora of the shales and coal includes *Calamites* (q.v.), *Lepidodendron* (q.v.), and *Sigillaria* (q.v.), reaching the size of trees; ferns, such as *Alethopteris*, characterising the higher beds; and, apparently from higher ground, some little known conifers. Mussels, probably fresh-water, such as *Anthracosia*, scorpions, millepedes, a great variety of insects belonging to a primitive type (*Palæodictyoptera*), especially from Commentry in France, and snails, such as *Pupa* and *Zonites*, and large salamander-like labyrinthodonts (q.v.), such as

Archegosaurus, the earliest of their class, occur in the same beds with this flora, though an occasional band contains marine shells. The system may be subdivided as follows :—

UPPER.—Coal-Measure series. (8,000 feet in Scotland ; 12,000 feet in South Wales.)	Upper : 150 to 500 feet. Middle : With Pennant Grit. 3,000 to 4,000 feet. Lower : With Gannister (a siliceous fire-clay). 450 to 2,000 feet.
MIDDLE.—Millstone Grit.	300 to 5,500 feet.
LOWER. — Carboniferous Limestone series.	Yoredale Shales and Grits. 300 to 4,500 feet. Thick or Scaur Limestone. 500 to 3,500 feet. Lower Limestone Shale or Tuedian, with Calciferous Sandstone of Scotland. 100 to 1,000 feet.

The divisions, as will be seen, vary exceedingly in thickness. In the north a few coal-seams occur in the Limestone and Millstone Grit ; but in the south the latter is known as Farewell Rock, no coal occurring in or below it. From its barrenness it is called Moor Rock in the north. In South Wales there are about eighty coal-seams with a total thickness of 120 feet ; in Staffordshire 30 feet are worked as one seam. It is probable that the highest beds of the Coal Measures, present at Autun, and in Bohemia, are absent in Britain. In addition to coal and iron (hæmatite, as at Ulverston, from the Limestone, and clay-ironstone from the Coal Measures) the system yields much valuable flagstone, especially the Yorkshire flags ; the Craigleith or Calciferous sandstone (q.v.) for building ; various marbles, grey, black, and encrinital ; millstones, grindstones, and honestones ; ores of lead, copper, and zinc in veins in the Limestone ; and, by distillation of the often bituminous shales, paraffin, alum, and copperas.

Carbon Monoxide, or CARBONIC OXIDE, is produced when carbonaceous matters burn in a quantity of oxygen insufficient for the formation of the dioxide. It is produced also when carbonic acid passes over heated charcoal, and is hence often found in the gases from coke stoves. It is very poisonous, as it forms a compound with the hæmoglobin of the blood with expulsion of the oxygen.

Carbon Process, a photographic printing process, which depends on the fact that gelatine becomes insoluble if mixed with potassium bichromate ($K_2Cr_2O_7$) and exposed to light. The paper ("pigmented paper," or "carbon tissue") is therefore prepared by coating it with gelatine, well-mixed with some finely-powdered pigment, as Venetian red, bone black, alizarin lake, etc. It is then sensitised by floating it on a solution of potassium bichromate, and dried. To obtain the print it is exposed to light under the photographic "negative." As no visible change occurs, the length of exposure must be gauged by experience, or by means of an instrument called the "actinometer." When fully printed it requires to be "developed." To do this the gelatine is transferred face downwards to another sheet of paper by pressing it on when wet, and peeling off the original paper support. It is then washed with hot water, which dissolves off the gelatine and pigments in the parts unexposed to light. It is next immersed in alum solution to harden the film, washed well in cold water, and dried.

Carbuncle. 1. A deep-coloured garnet cut *en cabochon*, that is, with a smooth, unfacetted convex surface. It is generally deep red or tinged with violet, the variety almandine, or iron-alumina garnet. The finest and largest specimens come from Ceylon and Peru. They often receive additional fire from a backing of metallic foil ; but the *carbunculus* of Pliny and the *bareketh* and *kadkod* of the Hebrew Bible, all named from their fire, seem most probably to refer to this stone. [GARNET.] 2. An inflammatory swelling of the skin and subcutaneous tissue, akin to a boil, but involving a larger area, and accompanied by more severe constitutional disturbance. Again, in a carbuncle the skin commonly gives way at several points, exposing the underlying slough, while in a boil there is but one opening. Carbuncle more usually affects men than women, and is particularly apt to occur in the subjects of gout or diabetes. The nape of the neck and the back are common situations of the disease. Treatment is generally confined to the administration of general remedies, with the local application of poultices ; in some instances, however, caustics are of service, and the obstinate cases are sometimes dealt with by free crucial incision.

Carburetted Hydrogen. [METHANE, ETHYLENE.]

Carcagente, a town of Spain in the province of Valencia, is situated near the river Tucar. Its inhabitants are mainly occupied in agriculture and manufactures of textile fabrics.

Carcassone, chief town of the French department of Aude, is situated on both sides of the river Aude and on the Canal du Midi. It comprises an old town and a new town, parts of the former dating back to the eleventh century, while the latter is well and uniformly built. Among its ecclesiastical buildings the first is the cathedral of St. Nazaire. There are also public buildings of considerable architectural merit. The staple industry is in woollens. In the thirteenth century Simon de Montfort and his followers burned 400 Albigenses in Carcassone and committed severe depredations upon the town.

Carcharodon, a genus of sharks belonging to the order *Lamnidæ*, known in a fossil state from Cretaceous times and represented by one living species, *C. rondeletii*, the most formidable of existing sharks, as were its congeners of those of past ages. It now attains a length of 40 feet, with triangular teeth with serrate edges, 2½ inches long and 1¾ inches wide ; but species in Tertiary strata had teeth five inches long and four wide. These were widely distributed, being found in the Suffolk and Antwerp Crag, in Malta, where they are sold as "the veritable teeth of St. Paul," in Egypt, New Zealand, Jamaica, South Carolina, and in Florida, where they are largely quarried for export to England for artificial manure.

Carcinoma. [CANCER.]

Carcalxite, a granite in which the felspar has been converted into kaolin or china-clay (q.v.), consisting, therefore, of quartz, kaolin, and mica, and constituting the "soft growan" of Carclaze, near St. Austell, Cornwall, where it is largely worked as a material for the porcelain manufacture. It is practically infusible, constituting what the Chinese call the bone of the ware, *i.e.* its less translucent part. [PETUNTZITE.]

Cardamom, the fruits of several plants belonging to the genera *Elettaria* and *Amomum* in the order *Zingiberaceæ*, which have an aromatic odour and a spicy taste and are used in medicine, curries, liqueurs, cattle-foods, etc. The fruit is a three-chambered capsule from a quarter of an inch to an inch in length, containing numerous angular seeds. They contain a camphor, $C_{10}H_{16}(H_2O)_3$. The true officinal cardamom is that of Malabar, *Elettaria Cardamomum*, with the shortest capsules. In the East, cardamoms are chewed with betel.

Cardan, JEROME, philosopher and mathematician, was born in 1501 at Pavia. As professor of mathematics at Milan he began to acquire fame, subsequently devoting himself to medicine. His renown as a physician secured for him an invitation in 1552 to Scotland to attend Archbishop Hamilton, who had suffered from asthma for ten years, and whom Cardan succeeded in curing. In 1570, while professor of medicine at Bologna, he was imprisoned for debt, and being released in the following year evaded his creditors by removing to Rome. Here he became a member of the medical college, and had conferred on him a pension by the Pope. In 1576 he died, it being reported that he voluntarily starved himself in order that a prophecy (he made pretensions to the gift) he had made as to the date of his death might be fulfilled. His writings were numerous and on various subjects, physics, mathematics, medicine, astronomy, ethical science, logic, music, and natural history. He also wrote his autobiography.

Cardenas, a seaport on the N. coast of Cuba, is the leading commercial centre of the island, and is about 120 miles S.E. of Havana.

Cardia, the Greek word for the *heart*. The inner lining of the heart is hence known as the endocardium, and the outer lining as the pericardium. The adjective cardiac is also extensively used. [HEART.] The portion of the stomach lying in close proximity to the heart is called the cardiac end of the stomach, in contradistinction to the pyloric end adjoining the pylorus. [STOMACH.]

Cardialgia. [HEARTBURN.]

Cardiff, a municipal and parliamentary borough of S. Wales, the chief town of Glamorganshire, is situated at the mouth of the river Taff, on the estuary of the Severn. The terminus of several railways, it is also provided with extensive and commodious docks, covering an area of about 200 acres. It is thus the chief centre for the export of the mineral and manufactured produce of S. Wales. Among the industries of the town itself are shipbuilding and ironworks. It has an old castle, built in the eleventh century, and celebrated as the prison in which Robert, Duke of Normandy, Henry I.'s brother, died in 1134. Other buildings of note are the county infirmary, town hall, university college, and public library and museum; and opposite to the castle grounds, on the banks of the Taff, are the Sophia gardens, a gift to the town from a former Marchioness of Bute. A suburb of Cardiff is the ancient city—the smallest in this country—of Llandaff. Cardiff is connected by steamers with America and the leading English and Irish ports. Pop. (1901), 164,420.

Cardigan, a municipal and parliamentary borough, S. Wales, county town of Cardiganshire, is situated on the S.E. of Cardigan Bay, at the mouth of the river Teifi. Its harbour, being obstructed by a bar, affords accommodation for vessels of light draught only. It engages extensively in salmon fishing, and does a considerable export trade in slates. The town is built chiefly of slate rock, its streets being narrow and irregular. In the neighbourhood are the ruins of Cardigan castle, and the leading edifices in the town are the ancient church of St. Mary's and the block of buildings embracing the town hall, exchange, markets, and library. Pop. (1901), 3,511.

Cardigan, JAMES THOMAS BRUDENELL, seventh EARL OF, general, was born in 1797 at Hambledon, in Hampshire. In 1818 he entered Parliament as representative for Marlborough, succeeding to the peerage on the death of his father in 1837. Meanwhile, in 1824, he had entered the army as cornet in the 8th Hussars, becoming lieutenant-colonel in the 15th Hussars in 1832. In this last regiment he succeeded in making himself one of the most unpopular of officers, and in the two years during which he was connected with it held 105 courts-martial and made 700 arrests. In 1840 he engaged in a duel with Captain Tuckett, and being arraigned before the House of Lords, was acquitted on a point of law. He was commander of the Light Cavalry brigade in the Crimean campaign, and led the Six Hundred at the famous Balaclava charge. For his services in the Crimea he received the Crimean medal, was made a K.C.B. and a Commander of the Legion of Honour. In 1859 he was appointed inspector-general of cavalry, attaining the rank of lieutenant-general in 1861. He died in 1868, and left no children, the title thus passing to the Marquis of Ailesbury.

Cardigan Bay, an inlet of St. George's Channel, on the W. coast of Wales, between the points Brach-y-Pwll and Sturm Head. Into it flow the rivers Maw, Dovey, Ystwith, Yren, and Teifi.

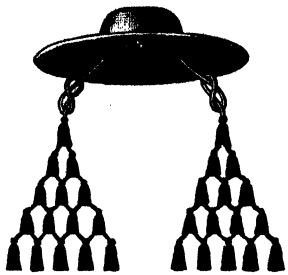
Cardiganshire, a sea-coast county of S. Wales, is situated on Cardigan Bay. It covers an area of nearly 700 square miles, quite a half of which is waste land. Towards the coast the surface becomes level, but the interior is mountainous, interspersed with fertile valleys. In the N.E. is Plinlimmon, the chief height, with an elevation of 2,469 ft., and in the S.E. Tregaron

mountain, 1,778 ft. Among its rivers are the Teifi, Dovey, Ystwith, and Rheidol. Its lakes are numerous, and a favourite resort of anglers. The county having an extensive coast-line, many of the inhabitants engage in fishing and become seamen, agriculture, however, being its main industry. Besides Cardigan, the capital, other towns are Aberystwith, Aberaeron, Lampeter, and Adpar. Some curious marriage customs still survive in Cardiganshire, among them being the practice of putting up to auction the presents received by a bride on her wedding. Pop. (1901), 60,237.

Cardinal, the name given to the highest dignitaries of the Roman Church next after the Pope, who is chosen by the Sacred College of Cardinals. The name is derived from the Latin *cardo* (a hinge), but there is a difference of opinion as to how it came to be applied to them, the general idea being that they were originally those who were "hinged in" or established in the churches of Rome, either as deacons aiding the Pope, or priests of the city churches, or bishops in the Roman diocese. Pius V. made them the Councillors of the Pope, Urban VIII. gave them the title of *Eminence*, and Sextus V. settled their number at 6 bishops, 50 priests, and 14 deacons—70 in all. They are nominated by the Pope, who has also the right of choosing some whose names he does not at once make known, but reserves to himself (*in petto*). If, however, he dies before declaring them, these nominations become void. The nomination does not give them the right to vote in conclave until the Pope has "opened their mouth." They do not leave Rome without leave of the Pope unless, being bishops, they have a see outside Rome. The Dean of the Sacred College consecrates the newly-elected Pope if he be not already a bishop. The special marks of a Cardinal are the red hat, the red biretta, and the red cassock. But a Cardinal belonging to one of the religious orders wears the habit of the order.

Cardinal, any bird of either species of the American genus Cardinalis, allied to the grosbeak (q.v.), but distinguished therefrom by the slightly bulging bill. The name is given by dealers to some allied species, though often confined to *C. virginianus*, the Cardinal finch, about the size of a starling. Americans are enthusiastic about its powers of song, and call it the Virginian nightingale. The male has brilliant red plumage (except round the bill and on the throat, where there is a tinge of black), and a conical erectile crest; the hen is rusty-brown.

Cardinal's Hat. Though the use of this bearing is strictly confined to certain dignitaries of the Roman Catholic Church, it is nevertheless a perfectly correct heraldic bearing. It is a low, wide-brimmed, scarlet hat, and takes the place of the mitre of Anglican bishops and archbishops. Pendant from the inside of the hat, and hanging upon each side of the escutcheon, are five rows of tassels, commencing with one on each side in the uppermost row, and having two in the second, three in the third, four in the fourth, and five in the lowest and final row. The archbishops and bishops in France surmount their arms with a similar hat, but of a green colour, and with only four rows of tassels; and abbots likewise, only the hat in this case is sable, and the tassels are reduced to three rows.



CARDINAL'S HAT.

Cardinal Virtues, a collection of qualities to which this name has been given by Catholic theologians. Of these four were acknowledged as important virtues by pagan moralists. They are Justice, Prudence, Temperance, Fortitude, which the Church has adopted under the name of the *Moral* virtues, adding thereto Faith, Hope, and Charity, which it calls *Theological* virtues.

Cardium. [COCKLE.]

Cardoon, *Cynara Cardunculus*, a plant closely allied to the artichoke, native to southern Europe and northern Africa, and cultivated as an esculent for 250 years. The stalks of the inner leaves, known as the *chard*, are blanched and become crisp, tender, and edible. The flowers when dried are used in France to coagulate milk.

Cards. Playing-cards are of unknown origin and antiquity. Some consider them to have come from the East, others, as there is no direct evidence of their having been introduced from the East, think that they had an independent origin. But the idea once prevalent—that they were invented to amuse a mad French king, seems to have no stronger foundation than the fact that an entry of 1392 speaks of a payment made for *painting* cards for Charles VI. They seem to have been used by the Arabs and Saracens for divination, an application of them not altogether lost at the present day. They existed at Venice in the 15th century, and though at first they had only numerical values, at this date there were coat (court) cards, and *atritti* Fr. *atouts* (trumps). In Spain the pack, as now, consisted of 52, but only of numerical values. There were variations in France and Germany, and England seems to have borrowed from all sides. Of the four suits, the Italian *cups* became hearts in Germany, France, and England; *money* became *bells* in Germany, and diamonds in France and England; *clubs* became leaves in Germany, *tréfles* in France, and clubs in England; *swords* (spades) became *acorns* in Germany, *piques* in France, and *spades* in England. The devices and dresses of the kings and other court cards date from the 15th century. But the old dresses and devices have been discarded in France, where often the court cards have different historical names assigned to them, and the aces have views of different towns. Cards are nowhere so solidly and carefully manufactured as

in England. Among the many improvements, or at least changes, introduced are the double heads to the court cards, the rounded corners, and the index to the number of the pips and the suit of a card. Cards have added not a little to the revenue of Great Britain, and the tax, which was 6d. per pack in Queen Anne's reign, has fluctuated through 1s., 1s. 6d., 2s. 6d., 1s., to the present duty of 3d.

Carducci, or CARDUCHO, BARTOLOMMEO, painter, was born in 1560 in Florence. Studying architecture, sculpture, and painting, he was employed to paint the ceiling of the Escurial library at Madrid, and became a favourite of Philip III. His most notable achievement is a *Descent from the Cross*, now in the church of San Felipe el Real, Madrid. He died in 1610.

Carducci, or CARDUCHO, VINCENZO, brother of the preceding, also a painter, was born in 1668 in Florence. He studied under his brother, Bartolommeo, and, like him did his chief work in Spain. In Madrid he taught the principles of his art, and brought out several distinguished artists, among whom were Giovanni Ricci, Pedro Obregon, Vela, and Collantes. He died in 1638.

Cardwell, EDWARD, VISCOUNT, was born in 1813 at Liverpool. Educated at Oxford, where he also held the professorship of ancient history, he in 1842 became a member of Parliament, supporting Sir Robert Peel, and subsequently joining the Liberal party. In 1874 he was raised to the peerage. He is chiefly known by reason of his reforms in the army, effected while he was Secretary for War under Mr. Gladstone. He was one of Peel's literary executors, and edited that statesman's memoirs. He died in 1886.

Careening, the operation of heaving a ship down so as to expose part of her bottom in order to enable it to be repaired, otherwise than in dock. The operation, which was effected by the application of a strong purchase to the ship's masts, has been, by the general introduction of coppered and steel or iron vessels, rendered almost obsolete. It was owing to her having been excessively heeled or careened that the *Royal George* foundered at Spithead in 1782. A ship is also said to careen when she heels over under the force of the wind.

Carelians, a historical people of Finnish race, so called by the Russians, but whose proper name is *Kariclasé* (in Finnish, *Karielaiset*); formerly spread over the whole of south-east Finland, and thence east to Lake Ladoga and north to the White Sea; converted to Christianity in 1227 by Russian missionaries, later brought into close contact with the Swedes, but in 1721 finally reduced by Russia. At present they number about 1,000,000, of whom 850,000 are in south-east Finland, the rest in Tver, Novgorod, Olonetz, and other parts of Russia. Those of Finland are nearly all Lutherans, the rest mostly either Orthodox Greek, or Raskolniks ("Old Believers"). Kalevala, the hero of the great Finnish epic poem, or collection of national songs, was a Carelian, and it was amongst this branch of the race that those songs were orally preserved before being collected and printed. The Carelians are described as remarkably shrewd, but suspicious, headstrong, and vindictive, and generally disliked by their Russian and Swedish neighbours.

Carew, THOMAS, poet, was born in 1589, and studied at Oxford. His wit and vivacity made him a favourite at Court, and he was considerably eulogised by Ben Jonson, Davenant, and other litterateurs of the period. His productions were chiefly masques and lyrics, his best known being *Cœlum Britannicum*, which was performed by the king and nobles at Whitehall on Shrove Tuesday of 1633. Carew died in 1639.

Carey, HENRY, poet and composer, was born in 1696 in London, and is said to have been the natural son of George Saville, Marquis of Halifax. His productions, comprising songs, burlesques, etc. with music sometimes, number over two hundred, the best known being *Sally in Our Alley*. He also is credited by some with *God Save the King*. He committed suicide in 1743.

Carey, HENRY CHARLES, economist, was born in 1793 in Philadelphia. The eldest son of Mathew Carey, a publisher, he in 1814 joined his father's business, remaining in it till 1835. He thereafter retired, devoting himself to study, and in 1836 began to publish his *Principles of Political Economy*. This was followed by other works, chief amongst which may be mentioned, *The Credit System of France, Great Britain, and the United States, The Past, the Present, and the Future*, and *The Principles of Social Science*. He was a protectionist—so far at any rate as America was concerned, and opposed to Ricardo's theory of rent, and to an international copyright. He died in 1879.

Carey, SIR ROBERT, son of Lord Hunsdon, was born about the middle of the sixteenth century. He distinguished himself in the service of Queen Elizabeth, and on the accession of Charles I. that sovereign created him Earl of Monmouth. He died in 1639 without issue, and therefore the title became extinct.

Carey, WILLIAM, missionary, was born in 1761 near Towcester, Northamptonshire. While a shoemaker's apprentice he joined the Baptists in 1783, and in 1786 became pastor of a Baptist congregation at Moulton, Lincolnshire, and next at Leicester. In 1793 he went to the East Indies as a Baptist missionary. He founded the Serampore mission, had a printing press, wherewith he produced Bibles, tracts, and other religious writings in different Oriental languages. He also published grammars and lexicons of Bengali, Mahratta, Sanscrit, etc., and from 1801 to 1830 was Oriental professor in Calcutta. He died in 1834 at Serampore.

Cargill, DONALD, Covenanter, was born about 1610, or, according to others, about 1619, at Rattray, Perthshire, After studying at Aberdeen and St. Andrews, he was ordained in 1655, and soon made himself obnoxious to Government by openly resisting their measures. He was wounded

in the battle of Bothwell Bridge, and was one of Richard Cameron's (q.v.) companions in the Sanquhar Declaration of 1680. He was beheaded in 1681.

Cargo is the freight with which a ship is loaded. For the ship to sail well, its cargo must be definitely known weight, and must be properly placed. Heavier articles are generally placed low down, to increase the stability of the vessel; but this principle may be carried to excess by the vessel becoming too rigid. This may cause fracture of the masts, because they do not yield sufficiently, and great stresses will also occur in the structure when it rolls at all heavily. Rolling should not disturb the centre of gravity of the cargo, otherwise there is danger of inability to recover from excessive careening. Hence the importance of storing all loose commodities compactly. Liquid cargo such as petroleum oil is carried in closed tanks. [SHIP, BALLAST.]

Caria, a maritime province in ancient geography of Asia Minor, occupied the S.W. corner of that country. It was early settled by Greek colonists, and was amongst the dominions of Crœsus, King of Lydia, on whose overthrow it passed under the Persian rule. Subsequently it fell under the sway of Alexander the Great's successors, and of the Romans. Among its principal towns were Cnidus, Halicarnassus, and Miletus. Its chief river was the winding Mæander.

Cariacou, CARJACOU, a name for any species of Cariacus, an old subgenus of Cervus [DEER], confined to America; specially applied to *C. virginianus*, the Virginian deer, ranging over the northern continent up to lat. 15° N. In size it is rather less than the fallow deer (q.v.). The beams of the antlers turn outward and forward, and the brow-line is directed upward. The colour is variable: the male is reddish-brown in spring, slaty-blue in summer, and dull-brown in autumn; the fawn is ruddy brown with irregular white spots which sometimes run into stripes. The flesh makes excellent venison, and the skin, when properly dressed, is very soft and is not affected by water.

Caribbean Sea, that part of the Atlantic Ocean between the coasts of Central and S. America and Cuba, Hayti, Porto Rico, Leeward and Windward Islands, communicates with the Gulf of Mexico by means of the Yucatan channel, and is the turning-point of the Gulf Stream.

Caribou. [REINDEER.]

Caribs, American aborigines, who are widespread throughout the north-eastern parts of South America, and who formerly occupied all the lesser Antilles, which inclose eastwards the Caribbean Sea, so named from them. They were undoubtedly cannibals, and the very word "cannibal" is a corrupt Spanish derivative from their name. But they have long disappeared from all the islands, either exterminated or expelled, the last displacement being the removal of about 4,000 from St. Vincent to the Mosquito coast, Central America, by the English in 1798. Here their descendants the "Black Caribs," mixed with Negro and other elements, still survive, and are the most active, enterprising, and industrious people on the whole seaboard. A few also appear still to linger in Dominica, and perhaps here and there in some of the other islets. But, with these exceptions, the whole of the race is at present confined to the South American mainland, and especially to Guiana, where their numerous tribes constitute a large section of the inhabitants. They are also met in Venezuela, and in the Orinoco basin as far South as the Amazon estuary, where the tribal names Carina, Calina, Callinago, Galibi, Carabisi, etc., are all variants of the same national name Carib. Physically, they are a fine race, tall, of ruddy-brown complexion, with long face, large though slightly oblique eyes, long black hair, and features of a somewhat softened American type, though towards Brazil they have become intermingled with other races, from whom they can scarcely be distinguished except by their speech, which is a stock language fundamentally distinct from all other native American tongues. As on the islands formerly, the women are often bilingual, conversing with the men in Carib and amongst themselves in an unknown language supposed to be that of some hostile tribe whose men were exterminated, and whose women were taken captive by the Carib rovers. (*See* D'Orbigny, *L'Homme Americain*, 1839; R. Schomburgk, "Contributions," etc., in the *Proceedings* of the Philological Society, 1848; and Martin's *Beiträge zur Ethnographie*, etc., *Amerika's*, Leipzig, 1867.)

Caricature, through the Italian from Low Latin *caricare* (to load), implies a satire—generally shown by drawings—which overlays or charges with exaggeration some natural feature of the object satirised. It is to be found in the old prehistoric carvings, in the barrack-room scrawl of the Roman soldier of Pompeii, and on the school-boy's slate or on the walls of the present day. Almost the first notable English caricaturist was Hogarth, and since his time the supply has never failed. Gilray was a noted caricaturist. Burke with the dagger, King George III. as the brobdingnagian farmer gazing at the lilliputian Napoleon, and many others of the same period are familiar to all. Next we have John Doyle (1829) [H. B.] and afterwards Richard Doyle, who was present at the birth of *Punch* in 1841. Who does not know the cartoons of Wellington and his nose, Peel and his nose, O'Connell and his Repeal cap, and at a later period Disraeli with his curl, Gladstone with his collars, Palmerston with the straw in his mouth, Lord R. Churchill with his moustache, and countless others, some exaggerated features of whom have become to the popular mind the real presentment of the man? In Germany and America caricaturists abound, France had its Cham, and our own *Vanity Fair* had its Pellegrini (Ape). With some illustrators of books it is difficult to say where legitimate illustration ends and caricature begins. This is particularly the case with Cruikshank and with H. K. Browne (Phiz).

Cariçma (*Dichlophus cristatus—Palamedra cristata*), an aberrant genus placed by some authorities with the Game-birds and by others with the Hawks. The single species is a bustard-like

bird from the plains of Brazil and Paraguay, feeding on lizards, snails, insects, and probably seeds. Its total length is about 32 in.; it has a thin crest, and the nape is clothed with long loose erectile feathers. The general plumage is pale brown, with irregular splashes of darker hue; under parts greyish white, bill red, legs orange.

Caries, derived from a Latin word signifying rottenness, decay, is a term applied to the gradual destruction of a bone by ulceration. It must be distinguished from necrosis, in which portions of bone perish *en masse*. With a view to emphasising this difference, caries has been described as the molecular death of bone, imperceptible portions of inflamed bone being destroyed and removed in the form of purulent exudation, while in necrosis actual masses of dead bone become separated. [SEQUESTRUM.] Thus the two terms caries and necrosis as applied to bone, correspond to the terms ulceration and gangrene as applied to other tissues. As the result of the carious process an abscess is formed, which usually discharges externally, leaving an open sinuous track at the bottom of which the dead bone is exposed. Caries is particularly apt to attack the vertebræ, leading to the various forms of spinal abscess, and to the deformity known as angular curvature of the spine. This form of bone ulceration usually occurs in strumous subjects, in whom the spinal mischief, serious as it is of itself, is very frequently associated with disease of other parts of the body. Strumous caries may also affect the joint ends of long bones and the bones of the carpus, and of the foot. Treatment in caries consists in enforcing absolute rest for the diseased parts, in securing the free discharge of collections of matter which form, and in administering tonics, such as cod-liver oil. If the carious bone is accessible, as in the carpus or tarsus, and the mischief progressive, it may be deemed advisable to remove the diseased bone in order to accelerate repair. Joints are excised or resected with a similar object. Caries of the spine does not, of course, admit of such radical measures, and attention must be devoted to supporting the patient's strength, and to endeavouring to secure union of the diseased surfaces by anchylosis (q.v.) in a favourable position. (For Dental Caries *see* TEETH.)

Carijos, an ancient Brazilian nation formerly dominant on the coast lands of São Paulo from Cananea Bay to the neighbourhood of the Patos lagoon. They were a quiet, inoffensive people, who, however, in 1585 came into collision with some whites from São Vicente, and in self-defence killed the whole party. This brought upon them the vengeance of the Portuguese settlers, by whom they were partly massacred and partly reduced to slavery. A few escaped to the woods, where they gradually died out or became merged in the surrounding tribes.

Carillon (Lat. *quatuor*), originally a set of four bells, but now denoting a great number of bells, so tuned and arranged as to be capable of playing airs and elaborate pieces of music. While a peal does not consist of more than 12 bells, and generally is of fewer, which are sounded from the inside by means of a clapper, and move through a half-circle when rung, the bells of a carillon are sometimes as many as 60 and upwards, and are fixed, the sound being produced outside by hammers which are worked sometimes by automatic machinery, sometimes by a kind of organ-board of keys, which are played on by an attendant. Very often both systems are in use. The Netherlands were especially noted for their carillons, the best being at Bruges and Antwerp. On the occasion of the Rubens tercentenary in 1877 a cantata was performed, one of the airs of which was first played by the orchestra on the Place Verte, then taken up by the carillons in the cathedral, and then sounded by silver trumpets on the top of the lofty tower.

Carinate Birds are those in which the breast-bone is furnished with a keel or ridge for the attachment of the muscles used in flight. [BIRDS.]

Carinthia, a duchy, and since 1849 a crown-land of Austria, is situated on the borders of Italy. Its surface, covering an area of about 4,000 square miles, is for the most part mountainous, and to a very limited extent under cultivation. The principal river is the Drave, which at one part of its course separates the Noric from the Carinthian Alps, the two main ranges. The main sources of wealth are the mineral products, though cattle and horses are abundantly reared, and hardware and textile fabrics manufactured, principally in Klagenfurt, the capital.

Carisbrooke, a village of the Isle of Wight, has a ruined castle where Charles I. was imprisoned thirteen months before his trial. It was also a Roman station, a Roman villa having been discovered here in 1859.

Carissimi, GIOVANNI GIACOMO, composer, was born in 1674 at Marino, near Rome. Very little is known of his life, which was devoted chiefly to the development of the recitative and the creation of the cantata. Among his oratorios perhaps the most widely known is *Jephtha*.

Carlén, EMILIE, novelist, was born in 1807 at Stromstad, Christiania Fjord. Her maiden name was Schmidt. From her first husband, a music-master by name Flyggare, she was divorced. She began to write novels when past 30. In 1841, being then a widow, she married a Stockholm lawyer and miscellaneous writer, J. G. Carlén, and in 1883 she died. Her novels (about 30 in number), which have been translated into various languages, deal with the every-day life of the lower and middle classes.

Carleton, WILLIAM, novelist, was born in 1794 at Pullisk, co. Tyrone. Of poor parentage, he received but a meagre education, on which he removed to Dublin, and began a literary career by contributing to the *Christian Examiner* a series of papers which were republished in 1820 under the title *Traits and Stories of the Irish Peasantry*. This was followed by another series in 1833, and in 1839 by *Fardorougha the Miser*. Other of his productions were *Misfortunes of Barney Branagan*, *Valentine McClutchy*, *The Black Prophet*, *The Tithe Proctor*, and *The Evil Eye*. He received a pension

from Government of £200 a year in consideration of his services to literature, and died (1869) at Dublin.

Carli, GIOVANNI RINALDO, writer on antiquities and economics, was born in 1720 at Capo d'Istria. While still young he was appointed to the chair of astronomy at Venice, subsequently resigning to devote himself to antiquarian research and political economy. On the latter subject his leading works were *Delle Monete, e della instituzione delle Zecche d'Italia*, and *Ragionamento sopra i Bilanci economici delle Nazioni*. The Emperor Joseph, recognising Carli's merits, appointed him president of the Council of Commerce at Milan. In addition to those named he wrote numerous other treatises. He died in 1795.

Carlile, RICHARD, freethinker, was born in 1790 at Ashburton, Devonshire. Converted by Paine's works into an aggressive Radical, he diligently sought to push the *Black Dwarf*, a London weekly edited by Jonathan Wooler, and of such pronounced views that the publisher was arrested. Carlile offered to take his place. After the *Black Dwarf* he next began to push the sale of Southey's *Wat Tyler*, in spite of the author's objection, and on the suppression of Hone's *Parodies* he reprinted them, and also produced an imitation of them, for which he got eighteen weeks' imprisonment. In 1818 he reprinted Paine's works, with a memoir of the author, and by the following year he had six indictments against him, and after a three days' trial was fined £1,500, with three years' imprisonment in Dorchester gaol. From here he began to issue *The Republican*, the first twelve volumes of which are dated from his prison, and for publishing it his wife in 1821 was sentenced to two years' imprisonment. Carlile, however, was irrepressible. He had his own imprisonment extended three years in lieu of the fine, and in 1821 a constitutional association, headed by the Duke of Wellington, was formed to raise £6,000 to prosecute Carlile's assistants. His sister Mary Anne was fined £500 and imprisoned for a year for publishing her brother's *New Year's Address to the Reformers of Great Britain*, 1821, and several of his shopmen were sentenced to periods of from six months to three years. For refusing to pay church rates and to give sureties for his good behaviour over the dispute he was sentenced to a further term of three years, and again in 1834–5 he served another ten weeks. For freedom of speech and of the press Carlile was a martyr, and out of his martyrdom came the subsequent insight into the futility and danger of suppression. He died in 1843. (*See* G. J. Holyoake's *Life and Character*.)

Carlisle, a parliamentary and municipal borough of England, and county town of Cumberland, is situated at the junction of the Caldew, Eden, and Petteril. It is an old town, and identified with the Luguvallum of Antoninus, and the Caerluell of the ancient Britons. Its castle, in which Mary Queen of Scots was imprisoned in 1568, was founded in 1092, and is now used as a barracks. Its leading feature, however, is the cathedral, portions of which date from the time of William Rufus. The town itself, though irregularly built, has yet some well-paved and spacious streets. The leading industries are in cotton, calico, and iron, and in the neighbouring streams salmon fishing is carried on. It is the terminus of several railways, and having been a border fortress, is rich with associations of former times. Pop. (1901), 45,478.

Carlisle, GEORGE WILLIAM FREDERICK HOWARD, seventh EARL OF, was born in 1802 in London. After a visit in 1826 to Russia, where he attended the Czar Nicholas's coronation, he entered Parliament as representative for the family borough of Morpeth, and became one of Earl Grey's supporters in the cause of Reform. In 1835, when member for the West Riding of Yorkshire, he was made by Lord Melbourne Chief Secretary for Ireland, and showed great tact in dealing with O'Connell. He also held, under Lord John Russell, 1846–52, the offices of Chief Commissioner of Woods and Forests and Chancellor of the Duchy of Lancaster. In 1848 he succeeded to the peerage, and from 1855 to 1858 held the position of Lord-Lieutenant of Ireland under Palmerston. In 1864 he died at Castle Howard, and (as he was never married) his brother succeeded him in the peerage.

Carlists, or followers of Don Carlos, brother of Ferdinand VII. of Spain, an ultra-clerical and reactionary party, who twice in the 19th century maintained a long and sanguinary civil war in the Basque provinces of that country. The Salic Law (q.v.) had been introduced in a modified form into Spain in 1700, during the war of the Spanish Succession, by Philip V. Ferdinand VII., the elder son of Carlos V., being left childless at the death of his third wife, and being anxious to keep his brother Don Carlos from the throne, married his niece, Maria Christina of Naples. On the birth of a daughter in 1830 the succession was, with the consent of the Cortes, settled on her by a royal decree called the Pragmatic Sanction, altering the Salic Law as introduced by Philip V. Ferdinand died in 1833. The child Isabella was proclaimed queen, her mother appointed regent, and a Liberal ministry took office. Don Carlos had taken refuge in Portugal after protesting against his exclusion, and there made common cause with the usurper Don Miguel. He was expelled thence as the result of the Quadruple Alliance, formed in 1834 between England, France, Spain, and Portugal. No steps, however, were taken to keep him out of Spain, and in the same year he appeared in Navarre, and rallied to his standard the Basque population, who had keenly-felt grievances against the Spanish Liberals. He had able generals in Zumalacarregui and Cabreras, and at one time, owing to a growing tendency on the part of the queen-regent to favour the absolutist party, he was within an ace of securing the support of the Liberals, and was preparing to march on Madrid. But he lost his chance by his stubborn refusal to give any assurances satisfactory to his new supporters. England and France, while refusing to aid the Spanish Government, permitted it to enlist volunteers among their subjects, and a foreign legion was raised under Colonel de Lacy Evans. The death of Zumalacarregui and the vigorous measures taken against Don Carlos by General

Espartero reduced the Carlists to despair. Violent dissensions arose amongst them ; and Don Carlos finally crossed the French frontier on September 14, 1839. He died in 1855 ; his eldest son (styled Carlos VI.) died in 1861 without issue, and a second son abdicated in favour of his own son, a third Don Carlos, who took the title of Carlos VII. After the overthrow of Queen Isabella there were risings, and on the abdication of Amadeus of Savoy, in 1870, the war again broke out, and was kept up in a desultory fashion in Northern Spain till 1876 ; but after the accession of Alfonso XII. it was terminated by General Martinez Campos. The late Don Carlos (*b.* 1848, *d.* 1909) was cousin to Alfonso XII., and left a son, Don Jaime de Bourbon (*b.* 1870), who has assumed his father's position.

Carlos, Don. [Carlists.]

Carlos, Don, son of Philip II. of Spain, was born in 1545 at Valladolid. Considered unfit to reign, he, though heir to the throne, was passed over in favour of his cousins, Rudolph and Ernest. This made him conceive an aversion to his father, and at the confessional on Christmas Eve of 1567 he revealed his design of intending to assassinate a certain person. The king was believed to be the marked victim, and Don Carlos's papers were seized. He was tried and found guilty of plotting against the king's life, sentence being left for Philip to pronounce. On July 24, 1568, he died, presumably murdered—at least the enemies of the king did not hesitate to put it about that he had murdered his own son ; of this, however, there is no proof, and it has been a vexed question ever since. The story of Don Carlos has provided the subject of various tragedies, chief amongst which is Schiller's.

Carlovingians, the second dynasty of Frankish kings, said to have originated in Arnulph, Bishop of Metz, whose grandson Pepin was mayor of the palace. The latter's son, Charles Martel, and his great-grandson Charlemagne were the most noted of the line, and, indeed, gave it its name. After the death of Charlemagne the dynasty declined, and finally gave place to the line of the Capets.

Carlovitz, a town of Austria, on the right bank of the Danube, and 8 miles S.E. of Peterwardein. It is the seat of an orthodox Greek archbishopric, and has a Greek theological seminary and a lyceum. It is a great wine centre, and of late years its produce, which is increasing, has made a considerable reputation in England. The town also exports vermouth. In 1699 a treaty was concluded at Carlovitz, by the mediation of France and Holland, between Turkey on the one side, and Austria, Poland, Russia, and Venice on the other, to settle their various boundaries.

Carlow. 1. A county of Ireland, in Leinster, having Kildare and Wicklow on the N., Wicklow on the E., Wexford on the S.E., and Kilkenny and Queen's county on the S. and S.W., with an area of about 350 square miles, consisting of level and undulating land, except in the S., where it is slightly mountainous. The chief industry of the county is dairy-farming, and a considerable quantity of grain, flour, and butter is exported. Coal mining is carried on, and there is quarrying of granite, limestone, and marble. Pop. (1901), 37,723. 2. A town of Ireland and capital of the county Carlow, about 57 miles S.W. of Dublin, situated at the junction of the Barrow and the Burren. It is an assize town, and is the seat of a Catholic archbishopric. The town is well built, and has two bridges, and among its public buildings are a Catholic cathedral, a theological college, and a lunatic asylum. The ruins still exist of a Norman castle built in 1180, and dismantled in 1650 by General Ireton. Carlow has many flour-mills, and carries on an important trade with Dublin and Waterford in corn, flour, and butter.

Carlsbad, or Karlsbad, a town of Bohemia in the Austrian empire, about 76 miles N.W. of Prague, on the right bank of the Eger at its junction with the Tepel. The town, which is situated in a valley between two wooded hills, and is surrounded by pretty scenery, is chiefly noted as a watering-place, on account of its hot mineral springs. The water varies from 117° to 165° F., and is charged with sulphate of soda and other salts, the twelve principal springs supplying about 2,000,000 gallons a day. Someone has described Carlsbad as a "town built upon the lid of a cauldron of boiling water." The waters were already known at the beginning of the sixteenth century, but the Emperor Charles IV. made its reputation by building a castle, some vestiges of which still remain. It was a favourite meeting-place of the German sovereigns, and in 1819 the members of the Holy Alliance held a conference there.

Carlscrona, or Karlskrona, a Swedish seaport and the chief naval station of the country, situated about 258 miles S.W. of Stockholm, in lat. 56° 10′ N., and long. 15° 36′ E. The town is built upon an isle and several islets, which are united to the mainland and to each other by dykes and bridges. There is little trade, and no special industries beyond those naturally appertaining to a naval station. Two forts defend the entrance to the harbour, which is deep enough to float the largest ships, and is provided with good dry docks.

Carlsruhe, or Karlsruhe, a German city, capital of the Grand Duchy of Baden, about four miles from the Rhine, and between 40 and 50 miles S. of Mannheim. The town took its rise from the building here in the forest in 1715, by the Margrave William, of a hunting-box, which by degrees he made his permanent residence and his court. The streets converge towards the palace of the Grand Duke, connected with which is a museum and an extensive library. There are several public buildings, including a large public library, and several hospitals, and there are manufactures of carpets, carriages, and chemicals.

Carlton Club, a Conservative Club so called from its occupying the site of Carlton House, built by Lord Carlton in 1709 and demolished in 1828. Carlton House was the residence of Frederick, Prince of Wales, son of George II., known to his

contemporaries as "Poor Fred," and later was inhabited by George IV. when Prince of Wales.

Carlyle, THOMAS, the son of James Carlyle, a stonemason, was born at Ecclefechan, Dumfriesshire, Dec. 4, 1795. He was the eldest of nine children. His mother's name was Margaret Aitken. He received his early education at Annan grammar school, and about the age of fourteen matriculated at Edinburgh University. His higher studies were intended by his parents as preparatory to the work of the Church, but Carlyle tired before long of this project. The idea of the clerical profession was finally abandoned in 1817. In 1814 he was appointed mathematical teacher in Annan academy, a situation, however, which he calls "flatly contradictory to all ideals or wishes of mine." After acting in this post for two years, he was asked to fill the mastership of a school at Kirkcaldy, in opposition to Edward Irving, who had not given satisfaction as teacher of the principal school there. Carlyle has left pleasing recollections of his sojourn in the town with Irving. Here also he met Margaret Gordon, the "Blumine" of *Sartor Resartus*. But he took ill to his routine work in Kirkcaldy, and left for Edinburgh in 1818, with no particular occupation in view, but feeling convinced that he "must cease to be a pedagogue." In Edinburgh he earned a livelihood by private tuition, and by translating pamphlets from the French on mineralogy. His first literary employment began with the contribution of various articles to Brewster's *Edinburgh Encyclopædia*. These included biographies of Montesquieu, Pitt, and others. From the beginning of 1819 he had begun to study German, and Goethe, Richter, and Fichte affected him distinctly at this period. In 1821 he sent a specimen translation from Schiller's *Thirty Years' War* to Longmans, and in the following year he wrote an article on "Faust" for the *Edinburgh Review*. In 1823 his *Life of Schiller* began to appear in the *London Magazine*. This, published in book form in 1825, was, on the whole, not unfavourably reviewed. He brought out his *Specimens of German Romance* in 1827, as a bit of "honest journey-work." From 1822 to 1824 Carlyle's income was decidedly improved by his engagement as tutor to Charles Buller, afterwards president of the Poor Law Board. From the summer of 1824 to the spring of 1825 he was a good deal in London, where he made the acquaintance of Coleridge and other men of note. At this time he visited Paris, where he introduced himself to Legendre, whose work on geometry he had recently translated. Now he received also a letter from Goethe, acknowledging his translation of *Wilhelm Meister*, part of which had been included in his book on German romance. In October, 1826, Carlyle was married to Jane Baillie Welsh. He thereupon settled in Edinburgh, hoping to acquire adequate support from his labours as a litterateur. The *Edinburgh Review* and the *Foreign Quarterly Review* were the main recipients of his work. His essays on Werner, Goethe, and Burns now saw the light. In 1828 Carlyle and his wife removed from Edinburgh to Craigenputtock, a farm fifteen miles N.W. of Dumfries; the change suited Carlyle himself perfectly, but entailed considerable sacrifices on the part of his wife. He was unsuccessful about this time in gaining a professorial post at University College, London, and also at St. Andrews. In 1830 began his connection with *Fraser's Magazine*, no doubt through the instrumentality of Irving. To *Fraser* he contributed essays on Madame de Staël, Boswell, and, most important of all, *Sartor Resartus*. He also continued his articles in the *Foreign Review* and the *Edinburgh*. His solitude at Craigenputtock was brightened by a visit from Emerson. In 1832 Carlyle returned to Edinburgh in order to be nearer materials for his *Diamond Necklace*, a sort of tragi-comedy on the history of Marie Antoinette. Urged by financial difficulties, he applied for the chair of astronomy at Edinburgh in 1834, and his disappointment in this caused an estrangement with Jeffrey. The upshot of this application probably hastened his departure to London, where he took up his abode at Cheyne Row in the summer of the same year.

In London Carlyle immediately set himself to his *History of the French Revolution*. The first volume of this, lent for perusal to his friend J. S. Mill, was accidentally burnt by the carelessness of a servant, and only rewritten after much effort and toil. In 1835 he met John Sterling, by whose father, the editor of the *Times*, he was offered employment, which he declined. In 1836 came the beginning of his warm friendship with Leigh Hunt. Now appeared also in America a volume edition of *Sartor*, with a preface by Emerson. In 1837 the *French Revolution* was completed. In May of that year Carlyle began a successful course of lectures on German literature. The autumn also saw a second edition of *Sartor*, which sold well—the first edition, privately printed in 1834, consisted of only 50 copies. In 1838 his article on Scott was published in the *Westminster Review*. At the close of next year his *Chartism* appeared in pamphlet form. In 1840 he delivered his lectures on "Hero Worship." The following year he was invited by a body of Edinburgh students to stand for a professorship, but refused. His domestic circumstances about this time were improved through the death of Mrs. Carlyle's mother bringing in an income of £200 a year. Sympathy with democratic movements in England had stirred Carlyle much since the time of his *Chartism*, and in 1843 he wrote his *Past and Present* as a development of his opinion in this direction. The public voice notably responded to him. To Mazzini, who visited him at this period, he was also not unsympathetic. At the close of 1845 he published his *Letters and Speeches of Oliver Cromwell*, a second edition of which followed early next year. Personal friendship with Emerson was renewed in 1847, when the American man of letters made a lecture visit to England. Carlyle's interest in the wretchedness of Ireland induced him to make a tour through that country in 1849. What he saw, however, both dissatisfied and depressed him. On his return he set to work on fresh literary endeavours; he wrote on the "Nigger Question" for *Fraser*, and produced also various *Latter Day Pamphlets*. So keen was Carlyle's political feeling

at this time that he seems to have actually contemplated entering public life. During the next ten years his life was a good deal clouded through want of complete accord with his wife. Various direct explanations of this fact are given, but the root of it was probably much divergency of disposition. His *Biography of John Sterling* was published in 1851. The success of this book determined him to pursue biography, and in 1852 he set about his *Life of Frederick the Great*. This, through lack of sufficient admiration for his hero, he found a rather hard task. Investigations on this subject took him twice to Germany. The first two volumes came out in 1858, the last in 1865. They were well received, though there was, at least, one parody of his doctrine of heroism here presented. In November, 1865, Carlyle was elected by the students to the Lord Rectorship of Edinburgh University. The inaugural address implied in this office he delivered in March, 1866. The pleasure of his warm reception on this occasion was immediately chilled by the news of the death of his wife, who expired suddenly while driving in her brougham. After this event he paid a visit to Mentone; his letters and diaries bear the impress of his vivid enjoyment of the scenes he passed through. On his return to England he began the composition of his *Reminiscences*. This, at the end of five years, he entrusted to Mr. Froude for future publication. In 1867 came *Shooting Niagara*, another latter-day pamphlet. In 1875 he published a sketch of the early kings of Norway in *Fraser*. In 1874 Carlyle was awarded the Prussian order Pour le Mérite, founded by Frederick; and Mr. Disraeli, as Prime Minister, offered him shortly afterwards the order of the Grand Cross of the Bath. This, however, was declined. His eightieth birthday brought him, among other testimonies of esteem, a medallion portrait in gold from more than a hundred friends and students. In his last days Carlyle was much attended by a favourite niece, Mary Aitken. The end came on February 5, 1881. By his own wish he was buried in his family burying-ground at Ecclefechan. He bequeathed the income of Craigenputtock to found ten "John Welsh" bursaries at Edinburgh University, in memory of his wife and her family.

The work of Carlyle both as man of letters and philosopher will be permanent. His *French Revolution* gives him a place, in its unique power, with the best English historians, while his *Cromwell* and *Frederick*, if displaying less his imaginative qualities, are portraits of great value. In regard to his literary essays, those that are best are of the first order. On Goethe, Voltaire, and Burns he may be said to have enriched English criticism. Though Carlyle concerned himself intimately with some philosophic subjects of only temporary moment, the spirit of his writings here, if not the actual letter, will not lose in effect. In the case of *Sartor Resartus*, at any rate, he produced a classic that has not unfitly been called "The Pilgrim's Progress of the Nineteenth Century." To be added to his power as a thinker is his great, if also perverse, mastery of language. As a literary personage Carlyle stands out in his century. He won by character almost as much as by genius. He impressed by his ideal as well as by his achievement. Truth, sincerity, and honesty were with him predominant watchwords, and to these the public mind gave ready answer. Of modern writers, only Byron, perhaps, was a greater force in his time.

Carmagnole, the name of a song and dance much in vogue in France at the revolution, and finally suppressed by Napoleon when he became consul. Some think it was derived from the Italian town Carmagnola, which was taken by the Republicans in 1797, others think it was named after a jacket which was popular during the revolution, while others again think the song and dance older than the jacket.

Carmarthen. [CAERMARTHEN.]

Carmel, MOUNT, a mountain chain of Palestine, stretching from the plain of Esdraelon to the Mediterranean, where it ends in a steep promontory about ten miles S. of Acre. As its name—which means "*park*" or "*garden*"—implies, it was well wooded, and oaks, pines, olives, and laurels grow upon its sides and summit, which is nearly 2,000 ft. above the sea. Carmel is mentioned in Scripture in association with the prophet Elijah.

Carmelites, a monastic order of Our Lady of Mount Carmel, founded in 1156 by Berthold, a Calabrian, and sometimes represented by tradition as having existed in some form or other from the time of the prophet Elijah. In 1209 the order was acknowledged by Albert, Patriarch of Jerusalem, and in 1224 received the recognition of Pope Honorius III. Driven from Palestine by the Saracens, the order took refuge in Cyprus, and from there spread to different parts of Europe. They held a general chapter in England in 1245. Pope Innocent IV. turned them into a mendicant order in 1247. One branch of the order with modified rules was known as the Barefooted Friars, and there was established a female branch of the order. They were particularly flourishing in France and Italy during the eighteenth century. In 1880 they shared in the fate of the other orders at the general expulsion from France.

Carmen Sylva is the name adopted in literature by Elizabeth, Queen of Roumania, who, born in 1843 of Prince Hermann of Wied and Maria of Nassau, married in 1869 Charles of Roumania. Her only daughter dying in 1874, the queen sought consolation in literature, and in 1880 published, under the name of Carmen Sylva, two poems at Leipzig. Since then she has written much and often. She also interests herself greatly in the industries of her countrywomen, and in the war of 1877–78 she won the hearts of her people by her devotion to the wounded.

Carmine, a beautiful red pigment obtained from cochineal. It is so obtained by treating the cochineal with boiling water, and then adding alum and cream of tartar, when the carmine is precipitated. Other modes are also employed, and about 1½ oz. can be obtained from 1 lb. of cochineal. The temperature and brightness of the day during preparation affect the brilliancy of

the pigment. Its chemical composition cannot be definitely stated, but it appears to be a mixture of *carminic acid* ($C_{17}H_{18}O_{10}$), the colouring matter of cochineal, alumina, lime, and some organic acid. It is used as "rouge" and as a pigment.

Carmona, a Spanish town, in the province of Seville, and from 15 to 20 miles from the city of Seville. A town of the same name existed in the time of the Romans, and there still exist two gates of that date. There are also Moorish ruins, and some fine ancient buildings, including a magnificent town hall. The chief industries are cloth and hat manufactures, tanning, distilling, and the making of oil.

Carnac, a French seaside village, on the bay of Quiberon, and about 20 miles S.E. of Lorient. It is nothing more than a fishing village, and has nothing remarkable in itself. But in the neighbourhood near the sea is a plain upon which are certain historical relics which have much puzzled antiquaries, who do not yet know whether to class them as Druidical remains, or to relegate them to a much earlier and prehistoric period. They consist of rude granite pillars or obelisks, arranged in eleven rows from east to west, covering a range of about 2,000 yards, and numbering eleven or twelve hundred. The highest are over 20 ft. in height. Their number was formerly much greater (there were 15,000 even in the 16th century), but since then many have been destroyed. Excavations in the neighbourhood have brought to light gold and jade ornaments and various other remains.

Carnallite, a hydrous potassium and magnesium chloride ($MgCl_2 + KCl + 6H_2O$), found in considerable quantity at Stassfurt in Prussian Saxony, associated with rock salt and with other potassium salts, and named after Herr von Carnall, director of the mines, who first called attention to its value as a source of potassium, for which it is now largely worked. It generally occurs massive and reddened from the presence of iron-oxide, breaks conchoidally, deliquesces and phosphoresces.

Carnarvon. [CAERNARVON.]

Carnarvon, HENRY HOWARD MOLYNEUX HERBERT, EARL OF, an English Conservative statesman, born June 24, 1831. He distinguished himself at Oxford, and his first speech in the House of Lords was commended by Lord Derby. In 1860 he published a book on *The Druses of Mount Lebanon*, as the fruits of his travels in the East, and in 1866, as Colonial Secretary, he formed a plan for the confederation of British North America. In 1867 he resigned office, being unable to agree with the Reform Bill introduced by Mr. Disraeli. In 1874 he again took office as Colonial Secretary under Mr. Disraeli, and again resigned in 1878, on the Government resolving to send the fleet to Constantinople. In 1885–6 he was Lord-Lieutenant of Ireland, and his negotiations with Mr. Parnell gave rise to a dispute as to their nature and scope. In 1869 he published *Reminiscences of Athens and the Morea*, and later some translations from Greek. He died in 1891.

Carnassial Tooth, the translation of a French term (*dent carnassière*) used by Cuvier to denote the last tooth but one in the upper jaw and the last tooth in the lower jaw in the typical Carnivora (q.v.). These teeth have sharp cutting edges, admirably adapted for dividing flesh, and generally a tuberculated process. They are much modified in different genera. Owen called them *sectorial* or *scissor-teeth*, for they act like the blades of a pair of scissors.

Carnatic, THE, a former division of India, upon the Coromandel Coast, extending from Cape Comorin to about lat. 16° N., and bounded on the E. by the Indian Ocean, its western limits being somewhat vague and undefined. Many large temples and other imposing monuments are proofs of its former splendour.

Carnation, or CORONATION, as Spenser calls it from its use in garlands, is *Dianthus Caryophyllus*, a species of pink apparently wild on the Continent, but in England only naturalised on the walls of Norman castles, perhaps from being introduced from Normandy by their builders. Its specific name was corrupted into gillyflower; its perfume gave it the name clove; its laced edges, the name picotee, from the French *picoté*, pearl-edged; and its use, that of sops-in-wine. The innumerable cultivated varieties, which are propagated by layering, may be grouped in four classes:—*cloves* or *selfs*, all of one colour; *flakes*, striped with one colour on a white ground; *bizarres*, striped with two colours on a white ground; and *picotees*, edged or laced with a distinct colour.

Carneades (213–129 B.C.), a Greek philosopher, born at Cyrene, in Africa, came early to Athens, and attended the lectures of Diogenes the Stoic, who is said to have taught him logic. For some unknown reason he abandoned Stoicism and became a Platonist, and founded the New or Third Academy. He was noted for his eloquence and power of persuasion, and in 155 he was sent with his old tutor Diogenes and another as ambassador to Rome. The philosophers in the intervals of business gave lectures, and Carneades, after one day convincing his auditors of the excellence of justice, convinced the same audience the next day of its utter hatefulness. This sophistical power had great effect upon both Cicero and Cato, and the latter wished to expel the ambassadors from Rome. In his later years Carneades became blind. The main point of his philosophical system was that man has no means of arriving at absolute truth.

Carnelian (from the Latin *caro, carnis*, flesh) is a common translucent red or brownish-red variety of chalcedony (q.v.) with a somewhat waxy lustre, distinguishing it from the duller, more horn-like sard (q.v.). It is much used by engravers for seals and also for "pebble" brooches.

Carniola, a division of the Austrian empire, having Carinthia and Styria on the N., Styria and Croatia on the E., Croatia on the S., and the Adriatic Sea and the Coast province on the W., with an area of 3,857 square miles. It was formerly part of the

kingdom of Illyria. The surface is mountainous, being crossed in the N. by the Carinthian Alps, and from N.W. to S.E. by the Carnic and Julian Alps. The most elevated summit is the Terglou, which has the only glacier in the province, and lies between the two sources of the Save. Lake Zirknitz (q.v.) is remarkable. The quicksilver mine of Idria is one of the richest in the world, and the province also produces iron and marble. A good deal of hemp is grown, and there is some weaving. Laybach is the capital.

Carnival, a word of uncertain derivation but generally considered to be a *lightening* or *recreation of the flesh*, is the name of a time of mirth and festival immediately preceding the time of Lent. It is more appropriate to Catholic countries than others, since where no particular gloom attaches to Lent there is no special object in feasting beforehand. It is generally marked by masked and travestied processions accompanied by a throwing about of flowers, or bonbons, or, in these degenerate days, flour, indigo, and other objectionable matters, and admits of a general licence which up to a certain point and within certain limited times and places is winked at by the authorities. Of old the carnival began at Epiphany, but it is usually confined at the present time to the few days immediately preceding Lent. In some towns no masks are allowed after 9 a.m. on Ash Wednesday. There is generally a renewal of the carnival festivities upon Mid-Lent Sunday. The carnival at Nice and Mentone has of late years attracted much attention in England, and many English take part in it. It is more suitable for the sunny south than for the colder north; and few things are more ghastly than a carnival procession on a cold raw rainy day of North Europe. It is a question whether the carnival be a relic of the Roman saturnalia or of some spring feast, or of both, or neither. The word itself differs in different countries. It is *Carnival* in England, *Carnaval* in France, and *Carnovale* in Italy.

Carnivora, an order of predaceous mammals, corresponding to the Feræ of Linnæus, without the Marsupials and Insectivora which he included. The majority of the forms feed on animal food; the typical forms—the larger cats—prey upon warm-blooded animals; in many the diet is of a mixed nature; and in a few, as in some bears, it is chiefly vegetable. It should be also noted that a mere flesh diet does not constitute an animal one of the Carnivora, for the Tasmanian Devil, exclusively an animal feeder, is a marsupial, and the blood-sucking vampire-bat belongs to the Chiroptera. The Carnivora are organised for a life of rapine, and are aptly designated by the popular name "beasts of prey." The toes are armed with strong claws, and are never less than four in number; the incisor teeth are generally three on each side in each jaw; the canines are long, strong, and recurved; the other teeth are variable in number, and are more or less modified into cutting organs according as the diet consists more or less largely of flesh. [CARNASSIAL TOOTH.] The highest type of carnivorous dentition may be seen on a small scale by examining the mouth of a domestic cat. The brain always presents well-marked convolutions, and some systematists place this order at the head of the animal kingdom. [CAT.] The Carnivora were formerly divided into three groups: (1) Pinnigrada (having the limbs modified into fin-like organs); (2) Digitigrada (walking on the tips of the toes); (3) Plantigrada (walking on the sole of the foot). The first was equivalent to the modern Carnivora Pinnipedia, which includes the seals and walrus. The other two together were equivalent to the Carnivora Fissipedia, or True Carnivora. The second group included the Æluroidea and Cynoidea, and the third the Arctoidea. (*See* these words.) The Carnivora are practically world-wide in their distribution, and fossil remains occur in all Tertiary formations. [CAVE-BEAR, CAVE-LION, MACHAIRODUS.]

Carnivorous Plants, a variety of plants belonging to widely-different groups and occurring in all parts of the world, though all established instances are dicotyledonous, and either aquatic or marsh-haunting forms, in which a considerable proportion of nitrogenous matter is obtained from animals captured by the leaves. These plants may be rootless, as are *Aldrovanda* and bladderworts (q.v.), or have a slightly-developed root system serving [illegible] for the absorption of pure w[illegible] from the [illegible]en wet sand or sphagnum bo[illegible] which others, such as the sundews (q.v.), flourish. The leaves in the butterworts (q.v.) are not modified in form, but have glands secreting a viscid liquid, and margins that slowly roll inward. Those of *Sarracenia* (q.v.), *Nepenthes*, and others, are variously modified into pitchers, sometimes baited with honey-glands externally, and having generally a slippery neck, downward-pointing hairs, and glands secreting a liquid within. The bladderworts have numerous minute bladders with trap-doors, but no liquid secretion. The sundews, and some allied forms (*Droseraceæ*) of exceptionally wide geographical distribution, have lobes or "tentacles" to their leaves, containing spiral vessels, and terminating in a gland secreting a viscid fluid; whilst *Dionæa muscipula* (q.v.), the Venus's Fly-trap of Wilmington, Carolina, has dry eglandular tentacles, with hairs on the blade of the leaf electrically sensitive to the merest trace of nitrogen, the two halves of the leaf-blade closing on a fly like a rat-trap. In this last case rapid motion is substituted for viscosity. In the butterworts, sundews, and *Nepenthes*, the liquid secreted becomes acid on nitrogenous stimulation: in *Dionæa* on stimulation a liquid already acid is poured out; and in all these cases a process of true digestion occurs. Zymases or peptogenic ferments are present, and the soft digestible part of the fly or other nitrogenous food is converted into peptones and absorbed. The experiments on the sundew of Dr. Francis Darwin, whose father, Charles Darwin, first directed general investigation to these plants, proved that the plant gains in size, weight, number of shoots, flowers and seeds, and in weight of seed from nitrogenous food taken in this way. In the bladderworts and *Sarracenia*, on the other hand, there seems to be no digestion, the plant merely

CARNIVOROUS PLANTS.

absorbing the liquid product of the decay of the captured organisms. As these, in the former, are largely minute crustaceans (water fleas, etc.), the term "insectivorous" is hardly so generally applicable as is "carnivorous." Any nitrogenous food can be taken, such as milk, beef, bacon, milk-biscuit, or even seeds. The delicacy of the test for nitrogen which they afford is one of the most marked peculiarities of the group. "One twenty-millionth of a grain of the phosphate of ammonia (including less than the one thirty-millionth of efficient matter) when absorbed by a gland" of the sundew "leads to a motor impulse being transmitted down the whole length of the tentacle, causing the basal part to bend, often through an angle of above 180 degrees" (Darwin). The captured fly is thus carried to the centre of the leaf: the protoplasm in the cells of the tentacle becomes contracted; and the secretion of all the tentacles becomes almost instantaneously acid. Many of these interesting plants are commonly and easily cultivated, and instructive experiments can be readily performed upon them.

Carnot, LAZARE NICOLAS MARGUERITE (1753–1823), French general, statesman, and patriot. After diligent study and brilliant examinations, he went in 1771 as second lieutenant of engineers to the royal school of Mezières, and quitted it with the rank of first lieutenant in 1773. He then went to Calais, where he followed up ardently his military studies, and in 1783 he wrote his *Éloge de Vauban*, which so pleased Prince Henry, brother of Frederick II., that he offered to advance Carnot's fortunes if he would take service in the Prussian army. At the outbreak of the Revolution he was deputy to the Legislative Assembly for the Pas-de-Calais, and voted for most of the revolutionary measures. As a member of the National Convention he voted for the death of Louis XVI. In 1793 he was elected member of the Committee of Public Safety, and was charged with the direction of the army. It was by his splendid organisation in this and the following year that the success of the French army was attained, and the admiration of his contemporaries showed itself in the bestowal of the epithet *organisateur de la victoire*. Among his other merits was that of recognising and employing the talents of General Hoche, and, at a later period, those of Napoleon Bonaparte. He had for a time to leave France owing to a disagreement with the Republican authorities, but the 18th Brumaire brought him back as war minister to the First Consul. But a misunderstanding with Napoleon drove him into retirement, though each had an admiration for the other, and showed it. In 1814, after the disaster of Leipzig, he offered his services to the Emperor, who accepted them gladly, and appointed him general of division and governor of Antwerp, of which city he made a splendid and celebrated defence. During the Hundred Days he was appointed Minister of the Interior and Count of the Empire, and after Waterloo advised Napoleon to continue his resistance. "Carnot," said the Emperor, "I have come to know you too late!" After the restoration he was exiled, and went first to Warsaw, then to Magdeburg, where he passed his latter years. A grandson, MARIE FRANÇOIS SADI, born 1837, was elected President of the French republic in 1887. He was assassinated in 1894.

Caro, ANNIBALE (1507–1566), an Italian poet, born at Civita Nuova. He was tutor in the family of a rich Florentine, and secretary in different noble families. Of his poetical works the best known is a translation of the *Æneid*. He also composed a comedy, *Gli Straccioni*, and published some *Rime* and *Canzoni*, and other works. He is chiefly noted for the freedom and grace of his versification. In prose he left behind a collection of letters, and made translations from Aristotle, Cyprian, and Gregory Nazianzen.

Caro, ELME MARIE (1826–1887), a French philosopher, born at Poictiers, educated at the École Normale, Paris, at Angers, and at Douai, was appointed lecturer at the École Normale (1857), professor at the Sorbonne (1867), and elected member of the Academy in 1876. His lectures at the Sorbonne were very popular, and were attended by ladies, and Pailleron, in his *Monde où l'on s'ennuie*, ridicules the "philosophe des dames." He wrote much, some of the most notable of his works being *Mysticisme au 18me Siècle*, *Le Matérialisme et la Science*, and *Le Pessimisme au 19me Siècle*.

Carob beans, LOCUST-PODS, SUGAR-PODS, ST. JOHN'S-BREAD, or ALGAROBA, the long flat pods of *Ceratonia Siliqua*, the only species of a genus of *Leguminosæ*, native to the Mediterranean region. *Ceratonia* is a small tree with pinkish wood, and walking-sticks of it are imported from Algiers under the name *Caroubier*. It has shining, leathery, dark, pinnate leaves of four or six oval leaflets; subdiœcious flowers with no corolla and only five stamens. The pods contain a quantity of saccharine pulp, besides nitrogenous matter. They were largely used for our cavalry horses in the Peninsular war, and are now extensively imported for the manufacture of cattle foods. They are eaten by children, but contain butyric acid, which is apt to become rancid, and they are also liable to mouldiness. On fermentation and distillation they yield an agreeable spirit. They are believed to be the "husks" alluded to in the parable of the prodigal son; but the locusts eaten by St. John the Baptist in the wilderness were more probably the insects so-called. The small seeds are said to be the original *carat* weight of jewellers.

Carol, from a Celtic word denoting a circular dance accompanied by a song, and at a later period restricted to the song. The idea of a ring is retained by an Italian word of the same derivation, and denoting a wreath and also a ring dance. At a very early period the word carol became especially associated with the joyous songs which accompanied the observance of Christmas. The carol of *Good King Wenceslas*, *Noel*, *There was a ship came sailing in*, and the carol sung by Amyas Leigh at the siege of Smerwick, which was admiringly listened to by Spenser and Raleigh, are good examples of the Christmas carol. The first printed collection of carols is of 1521, and this contains among others

the well-known *Boar's Head* carol. The Puritans did much to destroy carol-singing with all other forms of mirth, but the Restoration brought back the practice. The churches have now generally adopted them in a special Christmas service, and this has a tendency to let the more jovial kind die out as hardly fitted for present notions of what should take place in church. The most complete collection of carols is that of Sandys (1833). The French have their "Noels"; the Russians are much given to carol-singing, and there are considerable Manx and Welsh collections. The Carnival song, *We are beggars struck with blindness*, is said to be founded upon an old carol.

Carolina, NORTH, one of the Southern Atlantic states of America, and one of the original thirteen, is bounded on the N. by Virginia, S. by South Carolina and Georgia, E. by the Atlantic Ocean, W. by Tennessee; extending from lat. 33° 49′ to 36° 33′ N. and from long. 75° 25′ to 84° 30′ W., with a greatest width of 180 miles from N. to S., and greatest length 480 miles from E. to W., and an area of 50,707 square miles. The chain of the Appalachians rises in Mount Mitchell to a height of over 6,000 ft., and among the other ridges the Blue Ridge rises also to a height of 6,000 ft. in Mount Hardy. The table-land between the ridges is broken into fertile, well-watered valleys, which are eminently fitted for grazing and for agriculture. Of the rivers, Cape Fear river (250 miles) is the largest, and next in size is the Roanoke (150 miles). The lowlands to the north-east have extensive swamps, interspersed with lakes, the chief of them being the Great Dismal Swamp and the Alligator Swamp. The chief mineral wealth of the state consists of coal and iron, though gold and silver, and even diamonds also are found. The mountains are clothed with primeval forest, and the animals and birds are both various and abundant. The manufactures are numerous, including saw-mills, cotton-mills, and tobacco-factories, and there is much mining and quarrying. Raleigh is the capital of the state, and Wilmington the principal city.

Carolina, SOUTH, a Southern Atlantic state of America, is bounded on the N. and N.E. by North Carolina, on the S.E. by the Atlantic Ocean, and on the S.W. and W. by Georgia, from which it is separated by the Savannah river and its feeders, the Tugaloo and the Chatooga, extending from lat. 35° 12′ to 32° N., and from long. 78° 28′ to 83° 18′ W. It is wedge-shaped, with a coast-line of 210 miles, and a depth of about 240 miles, and an area of 34,000 square miles. For 100 miles inland the coast is alluvial, with swamps, and pine forests, beyond that is a belt of sand-hills, and then comes "The Ridge" of terraces with beautiful valleys and rounded hills, rising to the Blue Ridge in the N.W. with a greatest height of 4,000 ft. above sea-level. The state is well-watered, and the low-lying lands, together with the islands along the coast, produce much rice and cotton. The climate is much modified by sea breezes and by the mountains, and in the southern parts the orange, sugar-cane, fig, and banana are largely cultivated, but are sometimes damaged by frost. The state abounds in animals, birds, tortoises, turtles, alligators, and many kinds of serpents. South Carolina is not a manufacturing state. The capital is Columbia; but the largest city and commercial capital is Charleston.

Caroline, AMELIA AUGUSTA (1768–1821), second daughter of Charles, Duke of Brunswick, and wife of George IV. of England. At this day it is hard to realise the intense excitement which reigned in England a century ago over the wrongs of Queen Caroline, and how the whole country ranged itself on one side or other in the question. The Prince of Wales took a dislike to her after the marriage in 1795, and separated from her the next year. When, ten years later, reports of her misconduct led to the appointment of a commission of inquiry, popular feeling was strongly enlisted on her side. From 1814 she resided chiefly in Italy till the accession of the king in 1820, when, with the sympathy of the nation, she refused to abandon her rights, and came to England to demand her acknowledgment as queen. A bill for the dissolution of her marriage on the ground of adultery was brought into the House of Lords, but under pressure of popular indignation, and in the face of the boldness of her counsel, Brougham and Denman, it was abandoned, and her claim to the title of queen was admitted. But she was refused admission to Westminster Hall at the coronation of the king, and a month later she died.

Caroline Islands, a scattered group in the Pacific Ocean, between lat. 3° and 11° N., and long. 135° and 177° E.; situated to the E. of the Philippines, and to the N. of New Guinea. The Spaniards divide them into Eastern, Western, and Central islands. The Eastern islands are known as the Mulgrave archipelago, and contain two groups. The Western, or Pelew, islands have an area of 346 miles, and are almost surrounded by a coral reef. The soil is fertile, and there is an abundance of fish and turtle in the lagoons. Birds are in great variety, and cattle, sheep, and pigs have been introduced. The Central Carolines, or Carolines proper, consist of about 500 islands, composed of nearly 50 groups. The most important of the islands in this division is that of Yap, which has a good harbour. In 1899 the islands were sold by Spain to Germany.

Inhabitants. The bulk of the inhabitants are Indonesians, closely allied to the eastern Polynesians, but considerably modified by crossings with intruders from China, Japan, and the Philippine Islands, and probably also with a primitive Papuan element absorbed by the early Polynesian settlers. Hence a marked diversity of appearance and colour—fair in the west, coppery-red in the central group, almost black in the east. Here the Ualan islanders are not only black, but have also crisp hair, an almost certain evidence of Papuan blood. On the other hand, the natives of Nukanor and Satoan are direct descendants of the Samoans, as shown both by their physique, language, and customs. They are generally a mild, friendly, industrious, and peaceful people, skilful boat-builders, and daring navigators, making, by the observation of the stars, voyages of

great length in their apparently frail outriggers. The climate dispenses with much clothing, and their food consists chiefly of fish and vegetables, such as taro, the bread-fruit, and sweet potato. The eastern groups have been evangelised by American missionaries since 1849; but elsewhere the natives are still pagans, the dominant religion being Animism (q.v.), associated with the worship of trees, mountains, ancestry, and all moving things. In Ponapé are some cyclopean prehistoric structures, thick walls built of huge basalt columns from 25 to 35 ft. long; still more remarkable are the monuments in Ualan, including ramparts 20 ft. high and 12 and 13 ft. thick, formed of immense basalt blocks, which must have been brought from great distances. No satisfactory theory has been proposed as to the origin of these structures, which were certainly not erected by the present inhabitants. Since their contact with Europeans, the natives, like other Polynesians, are everywhere dying out, except in Nukunor (Mortlake group). Formerly over 100,000, the population is at present estimated at scarcely more than 30,000 in the Carolines proper, and 12,000 in the Pelew group.

Carotid, the great artery concerned with the supply of blood to the head. The common carotid of the right side of the neck takes origin at the bifurcation of the arteria innominata, that of the left side springs directly from the aorta. The vessels of the two sides have a nearly identical course in the neck, despite their different origins, they run upwards in the same sheath with the pneumogastric nerve and internal jugular vein; at the upper border of the thyroid cartilage each common carotid divides into an external and internal branch. The external carotid artery conveys blood to the face by its facial branch, to the tongue by the lingual, to the scalp by the occipital and posterior auricular, to the pharynx by the ascending pharyngeal, to the thyroid gland by the superior thyroid, and finally divides into the superficial temporal and internal maxillary branches. The internal carotid enters the cranial cavity by the carotid canal of the temporal bone, it gives off an ophthalmic branch, and divides into the anterior and middle cerebral arteries which supply the brain.

Carp, any fish of the Physostomous family *Cyprinidæ*, well represented in the fresh waters of the Eastern hemisphere and North America. In this family the mouth is toothless, the body generally covered with scales, the head naked, and there is no adipose fin. Examples are the carp, barbel, gudgeon, bream, chub, roach, dace, tench, and minnow. The carps are divided into numerous groups, comprising in all over one hundred genera. Most of the species feed on animal and vegetable matter, but some few live entirely on aquatic plants. In the type genus Cyprinus the dorsal fin is long and has a strong toothed bony ray, the anal is short, the snout is thick and rounded, and there are four barbules. The common carp (*C. carpio*), originally a native of the East, is said to have been introduced into England early in the seventeenth century, and is now fairly common throughout Europe, and is largely bred in America. The body is elongated, bluish-green in the darkest parts, fading into yellowish on the sides, and whitish beneath. The average length is from 12 inches to 2 feet, but specimens of even 5 feet are on record. It is a sluggish fish, frequenting ponds and quiet streams, supplementing its vegetarian diet with worms and aquatic larvæ, and hibernating in the mud in winter. Its fecundity is remarkable, and as a food fish it is valuable; its breeding is an important branch of fish-culture on the Continent, as it formerly was in the fish-ponds of English monasteries. Carp run into many varieties. The allied genus Carassius is distinguished by the absence of barbules. *C. vulgaris* is the Crucian carp, of which the Prussian carp is a variety; *C. auratus* is the gold-fish (q.v.). The Toothed Carps (constituting the family Cyprinodontidæ) are small fish, widely distributed in fresh, brackish, and salt water. The head and body are covered with scales, and there are teeth in both jaws, but there are no barbules.

Carpaccio, VITTORE (1455–1525), an Italian painter, born at Venice, and belonging to the early Venetian school. He is notable for his knowledge of perspective, the finish and richness of his colouring, and his power of invention and composition. His chief works are *The Arrival of St. Ursula at Cologne*, *The Presentation of Christ in the Temple*, and *The Meeting of St. Joachim and St. Anne with St. Louis and St. Elizabeth of Hungary*. The series of paintings adorning the Scuola, or guildhall of S. Giorgio degli Schiavoni, in Venice, has attracted the special study of Mr. Ruskin. An Italian critic said of the artist, "Aveva in cuore la verità" (He had truth in his heart).

Carpathian Mountains, THE, form a long curved range, chiefly in the Austrian empire. Separating Galicia from Hungary, and Moldavia from Wallachia, they form almost a semicircle, one end touching the Danube at Pressburg and the other at New Orsova, and having a length of over 800 miles. Of the two divisions the Eastern Carpathians rise to a height of 8,573 ft., and the Western, which extend along the northern boundary of Hungary, rise in the Eisthalerspitze to a height of 8,875 ft. The mountains are rich in minerals, including gold, silver, copper, iron, and quicksilver, and the sides are covered with forests, chiefly of pine and beech.

Carpeaux, JEAN BAPTISTE (1827–1875), a French sculptor, born at Valenciennes. In 1853 he exhibited at the Salon a bas-relief, representing *The Reception of Abd-el-Kader by Napoleon III. at St. Cloud*, and the next year he obtained the "Grand Prix de Rome." After his return to France he exhibited, in 1859, *A Young Neapolitan Fisher* (in bronze) listening to the sound of the sea in a shell. Among his other works, *Ugolino and his Children*, and *A Young Girl with a Shell*, are the most notable. He also composed a group for the façade of the Opera House, and executed a fountain for the Luxembourg Gardens, and gave lessons in sculpture to the Prince Imperial.

Carpel, the female sporophyll, or leaf bearing ovules, or immature seeds, among spermaphytes or flowering plants. There may be one carpel in the flower, as in the pea and bean family, when the fruit is necessarily *monocarpellary;* or, if there are more, when it is termed *polycarpellary*, they may be distinct (*apocarpous*), or united (*syncarpous*). In the early stages of development (and sometimes, as in the bladder-senna, *Colutea*, etc., much later) they closely resemble other leaves, and in the ripening of the fruit may dry up like a withering leaf, or may become fleshy and change colour from green to yellow, red, purple, or black, at the same time undergoing chemical changes such as the formation of acids and sugars. They bear the ovules either on their margins, like the buds in *Bryophyllum*, as in *Cycas;* or over their whole inner surface, as in poppies. [PLACENTATION.] Three is the prevalent number of carpels among Monocotyledons, though one, two, four, six, or higher numbers occur; whilst among Dicotyledons two, five, one, or an indefinite number is common.

Carpentaria, GULF OF, an arm of the sea indenting the north coast of Australia, from between lat. 10½° and 17½° S. and long. 136° and 142° E., bounded on the E. by York Peninsula, and on the West by Arnhem Land, and containing several islands. Several rivers flow into the gulf, among them being the Flinders, the Leichhardt, and the Roper. The gulf received its name from a river Carpentier, so called by its discoverer in honour of Pieter Carpentier, the Governor of the Dutch Indies in 1623.

Carpenter, MARY (1807–1877), a philanthropist who interested herself in India, and particularly in the condition of destitute children in England. She founded ragged schools and reformatories, and had a great share in initiating and influencing industrial school legislation. In the course of her work she visited India and Germany, and assisted at a Congress on Women's Work held in Germany. She was the founder of the National Indian Association.

Carpenter, WILLIAM BENJAMIN (1813–1885), brother of the above-mentioned Mary Carpenter, English physician and biologist. In 1838 he published his well-known work upon *General and Comparative Physiology*, and was appointed later professor or lecturer to the Royal Institution, to the London Hospital, and to University College. He was also Examiner and Registrar of the University of London. On his retirement in 1879 he was made a C.B. His death was owing to an accident with a spirit-lamp. As vice-president of the Royal Society he inaugurated the deep-sea sounding, and advocated the theory of vertical circulation in ocean waters. Besides his researches in Marine Zoology, Dr. Carpenter's contributions to the Science of Mental Physiology are well known.

Carpentry, derived from Celtic, and having the same root as *car* and *chariot*, seems to have formerly represented especially what we now call a wheelwright or coachbuilder. At present it denotes one who puts together woodwork, particularly such as is joined by nails, clamps, and the like, the word *joiner* being used for one who makes articles of furniture, and fits his work together by means of glue. In its widest sense carpentry is the art of putting together the framework of houses and other constructions, and is an important branch of building, demanding a wide and thorough knowledge of mechanics, such as the nature of materials, the principles of weight, resistance, and the like. In a narrower sense it is applied to any worker in wood, and denotes equally the man who puts up a conservatory and him who makes a rabbit-hutch or a dog-kennel.

Carpet (connected with Latin *carpere*, in the sense of carding wool), any woven fabric used for covering the floor of a room. The most ancient carpets certainly known are Persian, although some have thought that Assyrian carpets have been found. The Persian carpet is generally of a very thick pile, and one kind—felted—is of camel's hair. Next in general esteem are Indian carpets, of which the more ancient kind—made of wool—are said to have been copied from Persia, while a later kind of cotton are manufactured chiefly in Bengal and Northern India. Cashmere is almost as noted for its carpets as for its shawls. The Turkey carpet, which also has a pile, is mostly manufactured at Smyrna and neighbouring parts of Asia Minor. Of European carpets those of Axminster, Wilton, and Beauvais formerly had a great reputation. Kidderminster, which was the first place to produce machine-made carpets, makes them of 2 or 3 ply. The Union Kidderminster is of cotton and worsted. The Brussels carpet is of worsted upon a groundwork of linen. It may be of 6, 5, 4, or 3 frame, and has a velvet pile. There is also what is called the Tapestry Carpet. The Patent Axminster is of chenille upon a strong backing. One variety is called the Royal Axminster. Carpets are also made of jute. Though the generality of carpets are of sufficient size to cover a room, there is a growing custom of covering only the centre or small portion of a room, and to meet the demand a sort of rug or carpet is now being largely manufactured which does not differ much in size from the sleeping or praying-carpet of the East.

Carpet Moths, a number of moths of the group known as the Geometers. The popular name is derived from the beautifully-marked patterns on the wings. The common Carpet Moth (*Melanippe subcristata*) and the Garden Carpet Moth (*M. fluctuata*), are two of the best-known British species. The rarer *Melanthia albicillata* is perhaps the most beautiful.

Carpini, JOHANNES DI PIANO (1182–1253), a Franciscan monk of Umbria, sent by Pope Innocent IV. in charge of a mission to the Emperor of the Mongol Tartars who had invaded Europe, and seemed to threaten the existence of European Christendom. In 1245 he started from Lyons, and in the course of the next summer reached Karakorum, beyond Lake Baikal, returning to Kiev on his backward journey in the summer of

1247, bearing a letter from the Khan to the Pope. He published a Latin account of his travels, containing much valuable information. He was appointed Archbishop of Antivari, but did not long survive his expedition, the sufferings and hardships of which were enormous. Although over 60 he appears to have ridden 3,000 miles in 106 days, an average of over 28 miles a day.

Carpinus. [HORNBEAM.]

Carpocrates, an Alexandrian of the early part of the second century A.D., the founder of the Gnostic heresy, which appears to have been a mixture of Platonism and Buddhism. He held with Plato the doctrine of reminiscence, and with Buddha that of metempsychosis, till the soul returns to its true union with God. To attain this unity the practical life must be according to nature, and independent of moral and other laws—a theory which, as carried out by the members of the sect, had results that were more pleasant to themselves than edifying to their neighbours.

Carpology, the study of the structure and classification of the fruits of plants. [FRUIT.]

Carpus. [HAND.]

Carrageen, or IRISH MOSS, *Chondrus crispus*, a common edible sea-weed, collected in large quantities on the coasts of Sligo, Massachusetts, and Hamburg. It contains much mucilage, but its nutritive value is doubtful, and its sea taste militates against it as a substitute for isinglass. It was introduced as a remedy in pulmonary complaints; but is used either as a cattle-food, for thickening colours in calico-printing, for sizing cotton and paper, or, in America, for fining beer. It has a fan-shaped, repeatedly-forked frond, greenish or dull purple in colour.

Carranza, BARTOLOMÉ DE (1503–1576), a Spanish Dominican monk, who accompanied Philip II. to England on the occasion of his marriage with Queen Mary, and became the queen's confessor, and laboured hard for the restoration of Catholicism in England. Philip appointed him Archbishop of Toledo, but the jealousy of his enemies denounced him to the Inquisition as a heretic, and he was imprisoned for eight years. On appealing to Rome he was taken there, and confined in the Castle of St. Angelo for another ten years, and died soon after his final trial in 1576.

Carrara, a town of Italy, 62 miles from Florence and 30 from Leghorn, in a valley watered by the Avenza, and near the Mediterranean. The name of the town and its importance are derived from the marble which is quarried from the neighbouring mountains. There are from four to five hundred quarries, giving employment to many thousands of men, both in the quarries themselves and in the work of cutting and polishing. The marble has been worked from very ancient times, and is practically inexhaustible. The Romans knew it as *Marmor Lunense*, from Luna, an Etruscan town in the neighbourhood.

Carrel, JEAN BAPTISTE ARMAND (1800–1836), a French publicist, born at Rouen, and educated first at Rouen and then in the military school at St. Cyr. He served for a time in the army, but resigned in 1822 on the outbreak of the war with Spain, and went to Barcelona to fight on the side of the Spanish. Falling a prisoner into the hands of his former general he narrowly escaped a military execution, but was finally set free, and devoted himself to literature, becoming the secretary of the historian Thierry. After 1830 he edited and conducted the *National*, and in this capacity got into trouble with the authorities, and was embroiled in private quarrels. He was finally mortally wounded in a duel with M. de Girardin. His works were published in five volumes (1858).

Carriage (Low Latin, *carriagium*, from *carica*, load), literally, any vehicle possessed of wheels that can be used for the transport by land of goods or persons. In a more restricted sense, and that in which it is mostly used, the word signifies a four-wheeled vehicle impelled by animal power. In the wider sense wheeled vehicles seem to have been used for purposes of war, and at a later period for racing, and afterwards for domestic purposes. It was not till a much later period that they seem to have been commonly used as an article of luxury. Taking the narrower sense, the four-wheeled vehicle, when used for agricultural purposes or for the transport of goods, bears the generic name of waggon, of which there are many species, and when used for personal transport it bears the generic name of carriage, of which there are even more species than of the waggon. The carriage seems not to have been introduced into England before the year 1555, and a few years afterwards a lumbering vehicle without springs did duty as Queen Elizabeth's coach. One reason for the tardy introduction of carriages into England was the almost entire absence of roads in our modern sense of the word. The main roads were in that day in worse condition than many of the green lanes and byways that are still to be met with in some of the out-of-the-way parts of Sussex and other counties. Even as late as the 18th century we read of a king and queen taking two days for a carriage progress from Kew to London, and even then getting overturned into the mire upon the way. One great differentiating feature of the carriage is that the shafts or other means of attaching the horse or horses are not rigidly fastened to the body of the vehicle. The first great improvement in the construction of the carriage was the separation of the body from the framework to which the wheels belonged, and the consequent reduction of jolting. This was first effected by suspending the body from leather straps, a system which may be seen in the Lord Mayor's state coach, and in old family coaches. From that the transition was easy to the C springs, and to the elliptic springs in use at the present day. Improvements are constantly being made, especially in Great Britain and America, and carriage building has now become a highly complicated and specialised trade. A walk through the carriage factories of Long Acre, London, is not without interest to those who can find pleasure in considering the ingenuity which has been applied to the surmounting of various difficulties.

Carriage Dog, a breed named from the purpose for which it is kept—to follow the carriages of the wealthy—and often miscalled the Dalmatian dog, for it is probably of Indian origin. In size and shape it resembles a pointer (q.v.); the colour is white, with regular black spots, about an inch across.

Carrickfergus, an Irish seaport, forming a county in the province of Ulster, and county of Antrim, on the N. side of Belfast Lough, 9½ miles north of Belfast, and 12 miles S. of Larne. There is a twelfth-century castle, with a keep 90 ft. high, standing upon a rock which juts into the sea. William III. visited the town in 1690 before the battle of the Boyne, and the French Admiral Thurot landed a force of about 1,000 men here in 1760, and a few years later Paul Jones captured a British ship in the bay. There is some flax spinning in the town, and an oyster fishery.

Carrick-on-Suir, an Irish town in the province of Munster and county of Tipperary, on the Suir, 14 miles east of Clonmel, and on the Limerick and Waterford railway. On the other side of the river and connected by a bridge is the suburb of Carrickbog, which has a fourteenth-century abbey. The Butler family derive the title Earl of Carrick from this town, and there are still remains of their castle. Its industries are linen and woollen manufactures, and a trade in agricultural produce, and in the neighbourhood are important slate-quarries.

Carrier, one who conveys goods from place to place for hire for such persons as think fit to employ him. Such is a proprietor of waggons, barges, lighters, merchant ships, or other instruments for the public conveyance of goods. In a legal sense it extends not only to those who convey goods by land, but also to the owners and masters of ships, mail contractors, and even to wharfingers who undertake to convey goods for hire from their wharves to the vessel in their own lighters, but not to mere hackney coachmen. By ancient custom acknowledged by judicial decision, a common carrier of goods for hire is not only bound to take goods tendered to him, if he has room in his conveyance, and he is informed of their quality and value, but he is liable for their loss except in three cases. 1. Loss arising from the king's public enemies. 2. Loss arising from the act of God, such as storm, lightning, or tempest. 3. Loss arising from the owner's own fault, as by imperfect packing.

Carriers Act. In order to settle disputes as to loss and injury between carriers and persons whose property they carried, the Act of 11 George IV. and 1 William IV. c. 68 was passed, by which it is enacted that no common carrier by land shall be liable for the loss of, or injury to, certain articles, particularly enumerated in the Act, contained in any package which shall have been delivered, either to be carried for hire, or to accompany a passenger, when the value of such article shall exceed £10, unless at the time of the delivery of the package to the carrier the value and nature of such article shall have been explicitly declared. In such case the carrier may demand an increased rate of charges, a table of which increased rates must be affixed in legible characters in some public and conspicuous part of the receiving office; and all persons who send goods are bound by such notice, without further proof of the same having come to their knowledge. A carrier can refuse to deliver up goods which have come into his possession *as a carrier* until his reasonable charges for the carriage of same are paid. A person who conveys passengers only is not a common carrier.

Carrier, JEAN BAPTISTE (1756–1794), a French Republican and member of the National Convention. He was elected deputy in 1792, and was active in founding the revolutionary tribunal. He was a supporter of Robespierre, and was sent to Nantes to suppress a revolt. He here inaugurated the system of *Noyades*, or wholesale drowning, by which 16,000 persons are said to have perished. So great was the general indignation that he was recalled, and in 1794 was tried before the revolutionary tribunal, and guillotined.

Carrier Pigeon, a name used in two distinct senses: (1) a fancy variety of pigeon, which has long lost whatever "carrying" properties it once possessed, and which is now only bred for show purposes; and (2) the homing pigeon, descended from the Belgian *pigeon voyageur*, which is trained to find its way home when liberated at a long distance therefrom.

The fancy breed of Carriers originated in the East, and probably descended from the Persian messenger pigeon, to which, or to a closely-allied breed, the allusions in classic and mediæval literature probably refer. A breed of pigeons was used to carry letters during the Crusades, and mention of the employment of these birds for a similar purpose in Syria and the neighbouring countries will be found in Sir John Mandeville's *Voyages and Travels* (ch. x.). According to Moore, the author of the *Columbarium* (1735), the first general account of pigeons in the English language, the Dutch introduced these carriers into Europe. The fancy English Carrier is rather larger than the domestic pigeon, with a long body and neck, and a long bill, of which the upper mandible shuts over the lower like the lid of a box. But its peculiar points are the wattles on the bill, and the fleshy rosette, which should be of the size of a shilling, round the eye. The wattles ought to be quite distinct from the rosette, soft in texture, and standing out like the surface of a cauliflower; and the part on the upper mandible should be met by a corresponding one (sometimes called the jewing) on the lower. The plumage should be thick, and closely adpressed to the body. The favourite colours are deep black, dark dun, bright blue with black bars on the wings and tails, or pure white.

The bird now used occasionally as a messenger, but more generally for flying-matches, is of a composite breed, and is known as a "homer" or "homing pigeon." It should be noted that the name "carrier pigeon" is misleading. A writer in the *Field* remarked some years ago:—"A pigeon will fly homewards when set at liberty, and by its

means a message can, therefore, be sent from a given spot to the bird's home. But no pigeon ever did or ever will carry a message from home to any other spot." In appearance the homer differs little from the domestic pigeon, but is heavier and more stoutly built, and has a larger head with a fuller development of brain. Before railways and the telegraph had made communication rapid and easy, pigeons were often used in Great Britain to transmit news. In the eighteenth century they were sent up from Tyburn to announce the execution of a felon, and till beyond the middle of the nineteenth century they were used to bring intelligence of races, etc., to newspaper offices, and of the state of foreign exchange to brokers and stock-jobbers in London. These birds were either of the Antwerp breed, or had a good strain of the Antwerp blood. But it is in connection with the siege of Paris that homing pigeons are best known to the general public, owing to the establishment of what has been called the "pigeon-post." During the siege sixty-four balloons belonging to the French crossed the Prussian lines, carrying with them 360 homing pigeons. Of that number 302 were afterwards sent back to Paris, and, despite the efforts of the enemy to destroy them, 98 birds returned to their cots, 75 of them carrying microscopic messages rolled up tightly, placed in a quill, and tied longitudinally to the central tail feathers. Thus there were carried into the capital 150,000 official despatches, and a million private ones, which had been reduced by the photo-micrographic process.

According to Dr. Chapuis, long-distance pigeon-flying, as a form of sport, originated in Belgium—still its metropolis—in 1818. Since then it has spread to England, France, Germany, and Italy, in all which countries clubs have been established to promote the pursuit. The highest speed on record, as given by Mr. Tegetmeier, on the authority of Dr. Chapuis, is 1,780 yards—or rather over a mile—a minute. But in the report of an English club, published in October, 1891, nothing like this rate is mentioned.

The first race was from Exeter, the winning bird covered the distance (116 miles) at a velocity of 1,219 yards per minute. 119 birds were liberated for this race, *about two-thirds being reported home.*

The second race was from Plymouth, when the winning bird covered the distance (173 miles) at a velocity of 823 yards per minute. 108 birds competed, *about half being reported home.*

The third race was from Penzance (205 miles); the winning bird made a velocity of 672 yards per minute. 67 birds, *only one-third reported home.*

The fourth race was from St. Mary's Island, Scilly (245 miles); the winning bird made a velocity of 908 yards per minute. 27 *birds reported home out of* 86.

In the extracts given above it will be noticed that in the third race only one-third of the birds liberated returned home, and in no case did all return. This is very important, as showing how little instinct has to do with the flight of homing birds. Mr. Tegetmeier has pronounced against instinct and in favour of training; and he says:—"Pigeons must be regularly trained by stages, or they will be inevitably lost if flown one hundred or two hundred miles from home." Older observers were of the same opinion. Sir John Mandeville (*see* above) says that "the pigeons are so taught that they fly with those letters to the very place that men would send them to. For they are fed in those places where they are sent to, and they naturally return to where they have been fed." And Moore, in his *Columbarium*, after describing the Carrier, adds: "N.B.—If the pigeons be not practised when young, the best of them will fly but very indifferently, and may possibly be lost."

Carrière, Moriz, a German literary man and philosopher, born at Griedel in Hesse (1817), and appointed professor of philosophy at Munich (1853). He belongs to the school of philosophy which tries to reconcile Deism and Pantheism. He has written much, and on various subjects, and his works are widely read in Germany.

Carrion Crow. [Crow.] The name is sometimes applied in America to the Turkey Buzzard (q.v.). [Vulture.]

Carronade, a short piece of naval ordnance invented by one Gascoigne, and first manufactured at Carron, whence its name. It became a service weapon in the British navy in 1779, and remained in use until the middle of the 19th century. The following were the chief types:—

Nature.	Calibre in inches.	Length.	Weight.
		ft. in.	cwt. qrs. lbs.
68 pounder .	8·05	5 2	36 0 0
42 ,, .	6·84	4 3½	22 1 0
32 ,, .	6·35	4 0½	17 0 14
24 ,, .	5·68	3 7½	13 0 0
18 ,, .	5·16	3 3	9 0 0
12 ,, .	4·52	2 2	5 3 10

On account of their shortness they did not carry far, but at low ranges their smashing effect was considerable. Ships that carried them mounted them generally on the upper deck, poop, and forecastle only.

Carron Oil, a favourite local application to burns, composed of equal parts of lime-water and linseed oil, and deriving its name from its employment at the Carron foundry in the treatment of burns occurring there.

Carrot, *Daucus Carota*, a biennial umbelliferous plant, native of Britain, one of several species of a genus characterised by deeply-cut leaves, and long, flat, straight prickles on its carpels. The conical tap-root of the cultivated form contains 89 per cent. of water and 4·5 per cent. of sugar. Though known to the ancients, it is believed to have been introduced into England from Holland in 1558.

Carrying Costs. Formerly a verdict was said to carry costs when the successful party was entitled to his costs as incident to such verdict. Where the damages were under 40s. the successful party was not generally entitled to his costs, but later legislation has in many cases vested the control of the costs in the discretion of the presiding judge, so that this term has now to a great extent lost its significance, but where the action or issue is tried by a jury the *costs follow the event*, unless upon application made at the trial for good cause shown, the judge before whom such action or issue is tried, or the court, shall otherwise order.

Moreover (except on leave given) no order as to costs left by law to the discretion of the court shall be subject to any appeal.

Carson, CHRISTOPHER (more generally known as *Kit*) (1809–1868), an American trapper and hunter, born in Kentucky. He emigrated to Missouri, and made himself intimately acquainted with Indian habits and dialects. He was appointed guide in Fremont's expeditions, and in 1853 was nominated Indian agent in New Mexico. He was made a brevet brigadier-general for his services in the Civil war, and died at Fort Lynn in Colorado.

Carstares, WILLIAM (1649–1715), a Scottish clergyman and politician, who was a personal friend of the Prince of Orange, and had some share in bringing about the Revolution of 1688. Born at Cathcart, near Glasgow, of a Covenanting family, he was educated first at the University of Edinburgh and then at Utrecht, where he formed a friendship with William of Orange. On his return to England in 1674 he was imprisoned as being a cause of disaffection in Scotland, and was not released for nearly five years. In 1683, being again in Britain, he was examined and tortured before the Scottish Council for his share in the Rye House Plot. In 1685 he again went to Holland, and William appointed him court chaplain, and in this capacity he accompanied William to England, and was appointed royal chaplain for Scotland, and was one of the king's most trusted advisers upon Scottish affairs. He was still royal chaplain under Queen Anne, but lived in Edinburgh, having been made principal of Edinburgh University. He was four times moderator of the General Assembly, and was consulted about the Parliamentary Union of Scotland with England, which he did much to promote. George I. also confirmed him in his chaplaincy, but he did not live long to enjoy it.

Carstens, ASMUS JAKOB (1754–1798), a Danish artist, who did much to better the condition of art in Germany. At the age of 22 he went to study art at Copenhagen, and after practising for some years as a portrait painter at Lubeck, he went to Berlin, where his great picture, *The Fall of the Angels*, gained him a professorship at the Academy, a pension, and court employment. He then went to Rome and studied the works of Raphael and Michael Angelo, and inculcated a taste for high art into the German painters. He mostly represented scenes from the ancient classics, as well as subjects from Shakespeare and Ossian. Eventually he severed his connection with the Berlin Academy, and finally died in poverty at Rome.

Cart, a two-wheeled vehicle for the transport of goods or persons. It differs from the carriage not only in the number of the wheels, but in the fact that the shafts are rigidly attached to the body, and that the horse not only draws the vehicle, but also supports part of the weight, which, if not properly balanced, causes the horse much needless fatigue and annoyance. There are many varieties of cart for personal transport, but that used for agricultural purposes has undergone very little modification from ancient types. This kind of cart may have its capacity much increased by the use of side-pieces and outlying spars.

Cartagena. 1. The New Carthage of the ancients, is a Spanish fortified seaport upon the Mediterranean coast, in the province of Murcia, 29 miles S.E. of the town of Murcia, and 326 miles by rail from Madrid. The town is partly built upon a hill, and is separated from the harbour by a small plain, and is partly surrounded by mountains. Hills shelter the harbour upon the land side, while from wind and waves to seaward it is protected by a fortified island, which partly occupies the entrance. A ledge of rocks is in the centre of the harbour, which is in the other parts deep. The arsenal was formerly of great importance, but has lately been much neglected. The town, which is of Moorish aspect, is much decayed, but shows signs of revival since the establishment of a railway. A few miles from the town are rich mines, whose produce of lead, iron, copper, zinc, and sulphur make up most of the export trade. Esparto grass also is largely cultivated, and is used for ropes and sailcloth, and is exported in large quantities for the manufacture of paper. Cartagena has also numerous blast-furnaces and smelting-houses. The climate was formerly unwholesome, but has much improved of late since the draining of the marshes, which were a constant cause of ague and intermittent fever. 2. The capital of Bolivar, in Colombia, is on a sandy island on the north coast, and this island with another forms the harbour. It is connected with a suburb upon another island, and with the mainland by bridges. The harbour is the best upon the coast, but owing to the periodical silting up of a canal, which passes through a chain of salt lakes, and unites it with the Magdalena, much of its trade has passed away to a neighbouring port. The town is well built and well paved, although the streets are narrow, and there are cisterns of excellent water. The heat is great in summer, and there is a good deal of yellow fever. The chief exports are sugar, tobacco, coffee, and dyewoods, together with some caoutchouc and cotton. The town was taken and burnt by Drake in 1585.

Cartago. 1. A river and lagoon communicating with the Caribbean Sea, and situated near the northern extremity of the Mosquito coast. 2. An inland town of Costa Rica, of which it was the capital till its partial destruction in 1841, since which date it has much diminished both in number of inhabitants and in importance. The neighbouring volcano is 11,480 ft. high. 3. An inland city of Cauca in Colombia, situated near the junction of the Viejo with the Cauca. The climate is good, and there is a considerable trade in cattle, cocoa, coffee, fruits, and tobacco.

Carte, THOMAS (1686–1754), an English historian, son of a vicar of Clifton near Rugby. Educated at Oxford, he took orders, but joined the ranks of the non-jurors upon the accession of the Hanoverian dynasty. Suspected of complicity in the plot of Atterbury, he was obliged to take refuge in France for some years. He is noted for a *History of England*, which is of some value, owing to its

laborious accumulation of facts, which have proved useful to other historians. Several volumes of MSS. materials for continuing the history are preserved in the Bodleian Library at Oxford.

Carte-blanche denotes etymologically a blank paper, and, literally taken, denotes a paper whose use is authorised by a seal or signature, but whose powers and conditions are left to be filled in by another than the signer or sealer. A good example of carte-blanche is the blank cheque, so often read of and so seldom seen, where the drawer signs the cheque and leaves the amount to be filled in by the recipient. The lettres-de-cachet (q.v.) of Bourbon France are another example. The term is now used in the general sense of giving free permission to do a thing, or to incur expense, the giver of the permission holding himself responsible.

Carter, ELIZA (1717–1806), an English lady-scholar and translator. Her mother dying while the daughter was still young, she was taught Latin and Greek by her father—a Kentish clergyman—and she also made herself proficient in modern languages. She published a volume of poems, a translation of an Italian work upon Newton for the use of ladies, and a translation of Epictetus, which was received with much favour. She was on terms of friendship with many celebrated men of the eighteenth century, among them being Bishop Butler, Mr. Burke, Sir Joshua Reynolds, and Dr. Johnson, who had a high opinion of her as a Greek scholar, and printed some of her papers in the *Rambler*.

Carteret, JOHN, EARL GRANVILLE (1690–1763), an English diplomatist, orator, and statesman. His father, Baron Carteret, died when the son was five years old, and the young Baron was educated at Westminster and Christ Church, married in 1710, and the next year entered the House of Lords, and put himself on the side of the Whigs. In 1714 he made his first speech in the House in support of the Protestant succession, and was appointed a lord of the bedchamber upon the accession of George I. In 1719 he was ambassador extraordinary to Sweden, and arranged two treaties of peace between Sweden and other countries; in 1721 he was appointed Foreign Secretary, and in 1724 he entered upon a six years' lord-lieutenancy of Ireland. This brought him into contact with Swift, first as an enemy over the celebrated *Drapier's Letters*, but afterwards as an acquaintance and close friend. From 1742 to 1744 he was again Foreign Secretary, and tried to bring about an agreement between Maria Theresa, the Emperor of Germany, and Frederick the Great. In 1744 he was out of power, and became Earl Granville on the death of his mother, who was Countess in her own right. In 1751 he again took office as President of the Council under Henry Pelham, but took no further prominent part in politics, though he held office till his death, beyond being instrumental in bringing Pitt into office.

Carteret, PHILIP, an English sailor and discoverer of the eighteenth century, who took part in Byron's voyage, and commanded a ship in Wallis's exploring expedition to the southern hemisphere in 1766. The next year he became separated from Wallis in the Straits of Magellan, and, going on alone, discovered several islands, among them being Pitcairn's Island, and one in the Solomon group, which bears the name of its discoverer. In 1794 he retired from active service with the rank of rear-admiral, and died two years after.

Cartesian Devil, or CARTESIAN DIVER, called also the Bottle Imp, is a mechanical toy which illustrates atmospheric pressure. It consists of a hollow figure having a hole near the top, and partly filled with air and partly with water. This is partially immersed in water contained in a wide-mouthed vessel, the opening of which is covered with indiarubber or other elastic material. If pressure be applied to this cover, the air in the figure is compressed, and water enters to compensate, and the figure sinks, to resume its former position when the pressure is removed.

Carthage, an ancient town of North Africa, near the modern town of Tunis, and at that point of the coast which approaches most closely the island of Sicily. Its position was so favourable that not only was it the great maritime city which for so long carried on a life and death struggle with Rome, but after its destruction it was chosen by Julius Cæsar as a place for colonisation, and rose to be of great importance in the empire. Little is known of its early history beyond the legendary account—utilised by Virgil—of its foundation by Dido, and its being an off-shoot of Tyre, a view which seems borne out by the fact that Carthage used to send tithes of its revenue to the Temple of Melkart at Tyre. Even the etymology of the name is disputed, some thinking that it means "new city." As early as the sixth century B.C. Carthage had risen to great power, and possessed much of the N. coast of Africa, together with Sardinia, part of Sicily, the Balearic Isles, and Malta, besides having possessions in Spain and Gaul. She appears to have resembled England in this, that she looked on her vast possessions chiefly as a means of increasing her commerce, and it was her commerce that was her vulnerable point.

The history of Carthage falls naturally into three periods: The first from 880 B.C. for about 400 years, during which time she consolidated her African empire, and made the peoples of Northern Africa along a coast-line of about 2,000 miles her tributaries; the second from 480 to 264 B.C., the chief interest of which centres around her struggle for the possession of Sicily; and the third, from 264 B.C.—the period of her life and death struggle with Rome for the dominion of the seas, and so of the world—down to her destruction by Scipio in 146 B.C., and her reduction to the condition of a province of the Roman Empire. The chief source of our knowledge of the government of Carthage comes from the Romans, who were not much given to studying the races they conquered. Tradition said that they originally had kings, but the earliest authentic accounts of their constitution seem to show that they were governed by a senate of aristocratic and oligarchical tendencies, whose

deliberations were in some sort controlled and carried into effect by officers whose duties closely corresponded with those of the Roman consuls. There was also a democratic element in the senate, which gradually became predominant, and of which Hannibal and his family were the fruits. When in 480 the Carthaginians determined to get possession of Sicily at the time that Xerxes was invading Greece, the city was at the zenith of her prosperity. Her commerce was almost world-wide, her galleys visited the Canaries, Madeira, and perhaps America. They came north to Portugal, Gaul, and Britain, and even sought for amber in the Baltic, they brought elephants' tusks and gold-dust from Central Africa, and caravans brought them the spoils of the East African coast and the Indian seas. But from this moment dates their decline. Sicily proved a tougher foe than they thought, and eventually carried the war into their own territory, being aided by internal dissensions and revolt, and by the readiness of the tributary races, who were attached by no sentiments of patriotism, to join any foe who menaced Carthage. This struggle also brought them face to face with the iron-willed race that was destined to overthrow them; and the third and most exciting period of the history of Carthage was taken up by the wars, which were called by the Romans the Punic wars, and which fall more naturally under the head of Roman history, since it is from the Roman historians that we chiefly derive the history of the struggle, and even our knowledge of the life and career of the great Carthaginian patriot and general, Hannibal. For years after its destruction Carthage lay in ruins, and most people are acquainted with the picture—verbal or other—of Marius seated among the ruins of Carthage. Though Julius Cæsar did not live to see the fruits of his foresight, his Carthaginian colony flourished apace, and in the time of Augustus was once more the most flourishing city of Africa. In the third and fourth centuries after Christ Carthage rivalled Rome in splendour, and was of great importance in the history of the early Christian Church. Taken by Vandals of the fifth century, and by Belisarius in the sixth, Carthage still remained on till the invasion by the Arabs, when it was burnt by Hassan in 698. Its site is now occupied by a few Arab villages, and the fields of clover and corn that surround them.

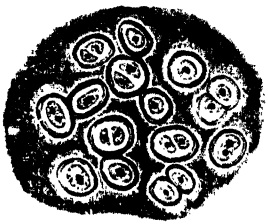
Little is really known of the religion and character of the people of Carthage, and that little is chiefly from information derived from their enemies. Their religion resembled in general features that of the Phœnicians at large, and is said to have been of a cruel and sombre type. They are said by the Romans to have been treacherous and untrustworthy, and that to a degree that made their name proverbial, but perhaps "*Punica Fides*" in a Roman mouth had as much significance as "*perfide Albion*" in the mouth of a Frenchman.

Carthamus. [SAFFLOWER.]

Carthusians, a monastic order founded in 1086 by St. Bruno (q.v.) and six companions in the solitary La Chartreuse, near Grenoble in France, from which they derive their distinctive name. They had no fixed rules until the time of the fifth Prior—Guigo—who issued the *Consuetudines Cartusiæ* in 1134. In 1176 they received papal approbation, and in 1180 they were introduced into England, our present Charterhouse taking its name from them. They were of great wealth and importance, given to hospitality and for the most part educated. The order is a very strict one, silence, solitude, vegetarian diet, and rigid fasts being some of their chief features. It has been erroneously put down as a branch of the Benedictines, owing to a similarity in the ritual used by the two orders. It consists of two classes—fathers and brothers. It is especially a contemplative order, and it is said to be from this cause that they have produced few saints. Italy, France, and Switzerland were the countries chiefly occupied by them, and since the expulsion of some monastic orders from France, they have founded some monasteries in England. There is a female branch whose rules are less austere. The most famous Italian monastery (now suppressed) of the order is near Pavia. [CERTOSA.] The renowned liqueur is made by lay brothers, for the benefit of the order. A characteristic of the order is that each "cell" is a small house of four rooms, with a garden, all the cells opening into one corridor.

Cartilage. The resistant yet elastic substance known as gristle or cartilage, plays an important part in animal structure. In the first place many bones are developed from cartilage. [BONE, DEVELOPMENT OF.] Cartilage which undergoes subsequent development into bone is called *temporary* cartilage. Secondly, cartilage is found as a *permanent* tissue occurring in the fully-developed body. Such permanent cartilage is of wide distribution; it covers the joint surfaces of bones, it serves as a connecting link between bone and bone, it forms the basis of such structures as the external ear and larynx, and constitutes the supporting framework of open tubes like the trachea and Eustachian tube. Cartilage when examined microscopically is found to be made up of cells imbedded in a supporting substance called the matrix. The permanent cartilage of the human body is divided into three varieties according to the characters of this matrix. In *Hyaline cartilage*, the first variety, the matrix is of uniform structure, and when examined in the fresh condition presents a ground-glass-like appearance. The costal and nasal cartilages, and the cartilage investing the ends of bones, and that found in parts of the larynx, and in the trachea and bronchi, are of the hyaline variety. In yellow elastic cartilage (found in the external ear, Eustachian tube, and epiglottis) the matrix is made up of fibres resembling the yellow elastic connective tissue fibres. [CONNECTIVE TISSUES.] In the third variety, *white fibro-cartilage*, the matrix is composed of fibres resembling white fibrous connective tissue fibres. This kind of cartilage occurs in the intervertebral discs, in sesamoid cartilage, and in the fibro-cartilages of the knee-joint. Cartilage is a non-vascular tissue, *i.e.* it contains no blood-vessels of its own, but derives nutrient materials from adjoining tissues. Its chief chemical

constituent is a body called chondrin, closely allied to gelatin. Cartilage may be affected by inflammation, and is involved in many morbid processes.



HYALINE CARTILAGE.
Showing cells enclosed in capsules and surrounded by ground substance. (Magnified about 400 diameters.)

The deposit of urate of soda in cartilage, which occurs in gouty persons, is a curious phenomenon, and cartilage undergoes important changes in rheumatoid arthritis (q.v.).

Cartilaginous Fishes, a book name for an order of fishes (Chondropterygii—the Elasmobranchii of Bonaparte), of the sub-class Palæichthyes (q.v.). The mere fact that the skeleton is cartilaginous is not sufficient to constitute a fish a member of this order; for in the Dipnoï and very many others of the Ganoids the skeleton is not ossified. On the other hand, Amphioxus (q.v.) and the Cyclostomata (q.v.), in all which the skeleton is cartilaginous in a high degree, fall considerably below the rank of fishes and form separate groups. [CHORDATA, CRANIATA.]

As the name of the class imports, these fishes date from a very remote period, and from the nature of the skeleton the remains are chiefly limited to the bony scales, teeth, and fin-spines. They range from the Silurian to the Jurassic, in which formation they exceed all other fishes in number, and this excess continues up to and through Tertiary times.

These fishes are nearly all marine. The skeleton is cartilaginous with traces of ossification in the vertebræ of some genera. The vertebral column is generally heterocercal (q.v.), the upper lobe of the caudal fin produced, except in the true Rays. Median and paired fins are present, the hinder pair on the abdomen. The air-bladder is absent or quite rudimentary; the heart has a contractile arterial cone communicating with the vessel which returns the impure blood to the gills for aëration. Gill-cover absent; gills attached to the skin by the outer margin with a varying number of intervening gill-slits. In some genera a gill-slit bearing a rudimentary gill, known as the spiracle (but bearing no relation to the spiracle of the Cetaceans), is placed behind the eye. The intestine has a spiral valve. The skin bears calcified papillæ, or bony scutes, to which the now obsolescent name of Placoid Scales was formerly applied. The ova are large and few in number, impregnated within an internal cavity, and in some instances deposited within horny cases which are often found empty on the sea-shore, and are locally known as mermaids' purses, fairy purses, etc. Some species are viviparous; that is, the eggs are hatched within the body of the mother. The males have intromittent organs attached to the ventral fins. The embryo is furnished with external gills, which fall off before maturity is reached.

The order is divided into two sub-orders: (1) Plagiostomata, or Plagiostomi, containing the Sharks and Rays; (2) Holocephala, containing only one family, of which the Chimæra (q.v.) is the type. [RAY, SHARK.]

Cartoon (from Ital. *cartone*, pasteboard), a full-sized design for a fresco or other painting, drawn upon stiff paper, and transferred by tracing or pouncing to the surface to be painted. The most noted cartoons are those of Rafael, now in the British Museum, and of which a romantic story is told how they were sent to Arras as models for tapestry, and years after were found among the lumber of the factory. A cartoon of Leonardo da Vinci, of *The Battle of the Standard*, and one of Michael Angelo of *Soldiers Surprised by the Enemy when Bathing*, no longer exist. The name is also applied to the political engravings in *Punch* and other similar publications.

Cartouch, (1) a kind of bag or case in which cartridge is conveyed for use by artillery. (2) The box or pouch in which a soldier carried his cartridge, now commonly called a cartridge-pouch. (3) A case of large shot, interspersed with musket-balls, which was put altogether into a gun as a charge. A *cartouche* is also a name used to denote an oval employed in hieroglyphic inscriptions to enclose inscriptions or descriptions. The same word is in heraldry used to denote an oval containing armorial bearings.

Cartridge, a bag or case of powder, attached or unattached to the projectile, and suitable for use as the charge for a heavy gun or small-arm. For heavy guns cartridge cases were anciently of paper, parchment, or flannel; they are now of silk. For small-arms they were anciently of greased paper, and at the time of the Indian Mutiny it was alleged that one of the causes of trouble arose from the Hindoo Sepoys —who hold the cow sacred—being required to bite off the ends of cartridges which were greased with beef fat. Modern breech-loading small-arm cartridge cases are usually of brass, with or without an iron head. The head is in most types pierced at the axis, or centre, so that it may receive the fulminating cap and the anvil on which the cap is to be struck by the hammer or pin of the piece.

SHOT CARTRIDGE. MARTINI-HENRI.

Cartwright, EDMUND (1743–1823), English poet, inventor, and clergyman. He was born at Marnham in Nottingham, and was descended from an old family who had suffered much for their

loyalty in the Civil war. He was educated at Oxford, and taking orders, entered upon a cure near Chesterfield. His favourite relaxation was poetry, and he published anonymously in 1762 some verses which were well received, and afterwards published *Constance, Arminia and Elvira*, and *Sonnets*, as well as other poetical works, and contributed constantly to the *Monthly Review*. A journey to Matlock in 1784 turned his attention to machinery, and though over 40 he began to study mechanics with all the ardour of youth, and to such good effect that he invented a machine for weaving that, with certain improvements, was generally adopted in the United Kingdom, and is the parent of the modern power-loom. He also invented a carding-machine, which was generally adopted, and brought out other inventions, including one for moving carriages without the employment of horses by means of a lever; and he also made experiments in steam. Like many other inventors he ruined himself, but Government, at the instance of the manufacturers of Manchester and other large towns, gave him £10,000 for his public services. Though this did not compensate his losses, it enabled him to pass his latter days in comfort.

Cartwright, GEORGE (1739–1819), an English traveller, born at Marnham in Nottingham. He made several voyages to the Indies, to Newfoundland, and to Labrador, lived for sixteen years among the Esquimaux, and published (1792) the results of his observations as a *Journal of Transactions, etc., on the Coast of Labrador*.

Cartwright, JOHN (1740–1824), brother of the Edmund Cartwright above-mentioned, born also at Marnham, served for a time in the navy, and in the Nottinghamshire militia, but left the service owing to his Radical sympathies. From that time he gave himself up to the study of agriculture, both theoretical and practical; and wrote much upon political questions. His views seem to have been sound and far-sighted, but in advance of his time.

Carupano, a town of South America, in the Republic of Venezuela, near the Sea of the Antilles and Cape Three Points, in the province of Cumana, and about 70 miles N.E. of the town of that name. It has a trade in horses and mules.

Carus, KARL GUSTAV (1789–1869), a celebrated German surgeon and physiologist. He was brought into notice by his teaching at the university of Leipzig, his native place, and received many public marks of esteem and recognition. Among his many works are, one on the *Circulation of the Blood in Insects; Psyche: a History of the Development of the Human Soul; Physis: a History of the Life of the Body;* and he was an exponent of the doctrine, which has received some countenance of late, that physical and mental perfection depends upon the result of a fight among antagonistic principles in the organism of animals. He was a many-sided man, and besides some valuable criticisms, he produced paintings that have not been without admirers among painters.

Carucate, in Anglo-Saxon and mediæval England, the amount of land a team of eight oxen could plough in a season, at first varying in size from 80 to 140 acres, according to the district, afterwards fixed at 100 acres. *Carucage*, a tax of 5s. per carucate was imposed by Richard I. in 1198. John reduced it to 3s. [BOVATE.]

Carving, in *Art*, is the cutting of the surface of any substance into artistic designs. The practice is of great antiquity, and ranges from the carvings upon wood or horn or stone by prehistoric man, to the elaborate work of Grinling Gibbons in the 18th century. One favourite substance with carvers, especially in the East, has been ivory, which, while very durable, is capable of the most delicate treatment. The great Chryselephantine statue of Athene was one of the chief treasures of Athens. Churches and other public buildings have been much enriched by carvings. The stalls in some of our old churches and cathedrals, the pulpit in Antwerp cathedral, St. Paul's Cathedral, the house at Chatsworth, are fine specimens of the art. In Germany, in the Dutch Zeeland, at Lisieux, and other French towns, are good specimens of wood carving as applied to the external and internal adornment of houses; while the Maoris of New Zealand were no mean adepts in the craft, and the South Sea islanders generally executed elaborate carvings upon their canoes and weapons of war.

Cary, HENRY FRANCIS (1772–1844), an English poet, born at Birmingham, educated at Oxford, and vicar of Abbots Bromley, is chiefly noted for his translation of Dante's *Divina Commedia*. He also translated Pindar's *Odes*, and Aristophanes' *Birds*, and wrote a continuation of Johnson's *Lives of the Poets*, and *Lives of the Old French Poets;* and published editions of several English poets. For some years he was assistant-librarian at the British Museum.

Caryatides, the priestesses of Artemis at Caryæ. The word is generally applied to draped female figures which were employed in Greek architecture as columns to support entablatures. The best known instance is in the Erechtheum at Athens (imitated in St. Pancras church, London). Tennyson speaks of them as used in the Woman's College described in *The Princess*. Male figures used for the same purpose were called Atlantes. There was a tradition which said that the people of Caryæ joined the Persians in their war with the Greeks, and that the Greeks in punishment slew the men and enslaved the women, and as a memento of their disgrace made their images in national dress do

CARYATIS.

duty as columns to their buildings. In the same way they employed the figures of Persian soldiers.

Caryopsis (from the Greek *caruon*, a nut; *opsis*, resemblance) is the characteristic fruit of the grasses. It is composed of two, or more rarely, of three, carpels united into a one-chambered superior ovary containing one seed, which so completely fills it that the coats of the seed are adherent to the walls of the ovary. The whole of the grain, or small dry fruit, is often miscalled a "seed." It differs from the achene (q.v.) in being syncarpous, and from the cypsela (q.v.) and nut (q.v.) in being superior. The deep groove, frequent down one side of the caryopsis, marks the union of the two carpels. *Nardus*, and some other grasses, are exceptional, in having a monocarpellary fruit, which is consequently an achene.

Caryota, a genus of palms having bi-pinnate leaves with cuneate leaflets with jagged ends. The fruits are small, round, purplish, and berry-like. Of the nine species, all natives of the East Indies, the best known is *C. urens*, the Kittool palm, 50 to 60 feet high, with a stem a foot in diameter, and leaves reaching 20 feet in length and 12 feet in breadth. From its flower spikes abundance of *toddy*, or palm-wine, is obtained, from which *jaggery*, or palm-sugar, is prepared by boiling. Sago is prepared from the pith-like central tissue of the stem; and *kittool*, or *Indian gut*, a useful fibre for brooms, brushes, and ropes, is the ramenta or fibre of the leaf-stalk.

Casabianca, Louis (1755–1798), a French sailor, born in Corsica, who, as a naval officer, was actively employed in the French fleet which aided the cause of American Independence. At the revolution he for a time mixed in politics, but as soon as possible quitted them for his more congenial element, the sea, and was appointed to command the man-of-war *L'Orient*. At the battle of Aboukir, after the death of his admiral, whose flag was on the *Aboukir*, he first secured the safety of his crew, and then blew up his ship. His little son would not leave him, and died with him. This incident has been celebrated by the French poets Lebrun and Chénier, and, with a modification of the incidents, by Mrs. Hemans.

Casale, a fortified town of Italy, on the river Po, in the province of Alexandria, and 37 miles E. of Turin. It was the capital of the duchy of Monteferrato, and is the seat of a bishopric, having a fifteenth-century cathedral, an old castle, and several public buildings. The river is crossed by an iron bridge. Its chief industry is the manufacture of silk-twist. There are many Roman remains in the neighbourhood.

Casanova de Seingalt, Giovanni Giacomo (1725–1798), a celebrated Italian adventurer, born in Venice, the son of an actor and actress, studied at Padua, and gave evidence of great and precocious intelligence. His escapades soon made Padua too hot for him, and he entered upon a life of adventure which led him to many parts of Europe. In 1755 he was confined in the Piombi of Venice, and his daring escape the next year made his reputation throughout Europe, and he was acquainted with Frederick the Great, Catherine II., Suwarroff, Rousseau, Voltaire, Louis XV., and Mme. de Pompadour. Later he was banished from Warsaw for a duel, from Paris and from Madrid for other causes, and still later, recognising that a new and more serious era had set in, became the librarian of a "prince without a library"—Count Waldstein of Bohemia—and composed his *Memoires*, a book of cynical confessions, entertaining, but not fitted for general reading by reason of their licentiousness. He has been called the wandering Jew of vice, and a "*fille de joie faite homme*."

Casaubon, Isaac (1559–1614), a Calvinistic theologian, critic, and scholar, born at Geneva, and after an education disturbed by religious persecution in France, to which his father—a Huguenot pastor—had returned, he was appointed at Geneva professor of Greek, in which he had made singular progress. He was summoned to Paris in 1598 by Henri IV. to teach in the university, but owing to his attachment to Protestant principles the king could not give him this appointment, but made him royal librarian. After the king's assassination Casaubon went to England, where he was well received by James I., who made him prebendary of Canterbury and of Westminster, and gave him a pension of £4,000. Casaubon was a good critic, but it was as a Greek scholar that he excelled, and his numerous works enjoyed a great and extensive reputation. Justus Lipsius, Scaliger, and Casaubon have been quoted as a literary triumvirate.

Cascade Mountains, a range of mountains upon the Pacific coast of North America, nearly parallel with the coast, and continuing the line of the Sierra Nevada of California, through Oregon and Washington territory, and joining the Rocky Mountains in the north, in the territory of British Columbia. The cascades from which the chain takes its name are caused by the river Columbia, which breaks through the range, and descends in numerous waterfalls. The principal heights of the range are Mount Hood (14,000 ft.) and Mount Jefferson, slightly lower, and the volcanic peak, Mount Helen (12,000 ft.), and others.

Cascarilla, the bark of the *Croton eluteria*, is employed in medicine. There are two officinal preparations, an infusion and tincture. They contain a bitter substance, cascarillin, and are of use in dyspepsia.

Case signifies a narrative statement of facts submitted for the opinion of counsel, or a similar statement from an inferior to a superior court for its consideration. Since the year 1883 parties may concur in stating questions of law in a special case; or, if it appears to the court or a judge from the pleadings or otherwise that there is a question of law which it would be convenient to have decided in that manner, they or he may order a special case to be stated. The Court of Chancery used to direct such cases for the opinion of a court of law, but such references are now unnecessary, the divisional court having full power to determine

the same, subject, of course, to appeal. In divorce and probate practice a party making a motion must file, among other papers, a case containing an abstract of the proceedings in the suit, a statement of the circumstances on which motion is founded, and the prayer or nature of decree sought. By an Act passed in the year 1857 (20 and 21 Vict. c. 48), justices of the peace may be required, at the insistance of any party dissatisfied with their decision in their summary jurisdiction on a point of law, to state and sign a case for the opinion of the divisional court of the High Court of Justice.

Casemates, in an ironclad, armoured bulkheads protecting the guns, which project through portholes made in the casemates.

Casein, a white friable protein substance [ALBUMINOID] which occurs in the milk of all mammals to the extent of about 40 per cent. From milk it may be obtained by adding acetic acid, and washing the precipitated casein with water, alcohol, and ether. It is soluble in weak alkalis, and the solution coagulates if heated.

Caserta, an Italian town, capital of Terra di Lavoro, and about 20 miles from Naples. The wines of the neighbourhood are noted, and there is a celebrated palace built after the designs of Vanvitelli, one of the architects of St. Peter's at Rome, with a park containing three different gardens, and a magnificent aqueduct nearly 20 miles long. There is a royal silk factory employing several hundred people.

Cash-book. The cash-book records all money transactions. On the Dr. or left-hand side is entered all moneys received, and on the Cr. or right-hand side all moneys paid.

Cash (Fr. *caisse*) formerly denoted a box or repository of coin, and is so used by English writers. It has now a varying signification, sometimes meaning ready-money in the shape of coin, more frequently coin and bank-notes, and in a wider sense is made to include any negotiable paper or security.

Cashel, an Irish town in the county Tipperary, and province of Munster, 49 miles N.E. of Cork, and 30 miles S.E. of Limerick, on the left bank of the Suir, built on the slope of a hill rising abruptly from the plain. It was formerly the seat of the kings of Munster, and has many interesting ruins, especially those situated upon the celebrated Rock of Cashel. Among these are a round tower nearly 90 ft. high, the king's palace, Cormac's chapel of Saxon and Norman architecture, and the twelfth century cathedral said to have been the largest in Ireland. There is a Catholic archbishopric and an Irish church bishopric here; and the town was till 1870 a parliamentary borough. Henry VII. received here in 1172 the homage of the King of Limerick, and held an ecclesiastical council.

Cashew Nut, the fruit of *Anacardium occidentale*, a large tree belonging to the order *Terebinthaceæ*, and native to the West Indies, though cultivated throughout the tropics. The tree bears clusters of fragrant rose-coloured flowers, which are succeeded by large, fleshy, pear-shaped receptacles bearing kidney-shaped fruits. The latex of the stem dries black, and is used as varnish. A gum known as *Cadjiti gum*, used by South American bookbinders to keep off ants, is exuded; the acid and slightly astringent receptacle is eaten; the mesocarp of the fruit contains a quantity of black, caustically acrid oil, also used to keep off ants; and the kernels, when roasted, are wholesome and agreeable.

Case-hardening is the conversion of the surface of wrought-iron objects into steel by the addition of a small percentage of carbon. This is effected by heating them to a red-heat in contact with charcoal powder, leather or horn parings, or other matter containing the carbon required to effect the change. The objects are then cooled in water or oil, and will be found to be encased in a thin skin of steel, ordinarily $\frac{1}{16}$ to $\frac{1}{8}$ of an inch thick. The depth of the steel coating depends on the nature of the wrought iron and on the duration of heating. Objects so treated are more durable and better capable of receiving polish.

Cashmere (variously spelt, but Kashmir according to latest Indian authorities), a country of Northern Hindostan, bordering upon Thibet, is a mountainous region forming part of the Himalayan system. It includes valleys as well as mountains, the best known being the "Vale of Cashmere," celebrated both in history and poetry for its fertility, and for the beauty of its scenery. This valley is surrounded on all sides by the Himalayas, and lies mostly between lat. 33° 30′ and 34° 35′ N. and long. 74° 20′ and 75° 40′ E., thus being about 120 miles long and about 80 miles wide, and having an estimated area of 5,100 square miles, being about 5,500 ft. above sea-level. The river which flows through the valley is the Jhelum, and there are two lakes in its course, through one of which it flows before changing its course westward to enter the Punjab. The best roads to the capital, Serinagur or Srinagar, are one of about 130 miles, from Rawal Pindi in the Punjab through the Jhelum valley, and another from Bhimbar, north of Gujerat, by a pass 11,000 ft. above sea-level, over the Pir Panjal range. The floating gardens of the lakes are a conspicuous feature. The valley is renowned for the abundance and variety of its fruit, and the vine is largely cultivated. The capital is upon both banks of the river, which is spanned by seven bridges; and its people are much occupied in shawl-weaving and in lacquer work, besides working in silver and copper. Cashmere became part of the Mogul empire in the sixteenth century, and was overrun by Sikhs in 1819, and its Maharajah is now under the protection of the British Government. It is now in great repute as a health station. The ruling people in Cashmere are high-caste Hindus, who in their upland valleys have better preserved the primitive Aryan type than those of the plains. Thus the colour is even of a lighter brown than amongst the Rajputs, while the women are often fairer than those of Andalusia. The men are of medium height, with slightly aquiline nose, large eyes, often blue or

light green, thin lips, chestnut hair, full silky beard, square shoulders, and thick-set frames, but like most Asiatics, falling off in the lower extremities. They are quarrelsome and blustering, but great cowards, yielding like cravens to the least show of resistance. They wear a flowing woollen tunic and wide pantaloons, and dwell in houses whose wooden roofs and gables present a striking resemblance to the Swiss châlets. The language is a neo-Sanscritic dialect of intricate structure, written in a still more intricate character derived from the Devanagari. Most of the people of the Vale of Cashmere are Mohammedans of the Sunnite sect, though there are numerous Shiah communities in the towns, chiefly weavers. Some are also still Brahmans, while others have joined the religion of the Sikhs. Owing to a succession of calamities—epidemic, earthquakes, famine, and maladministration—the population fell from 800,000 in 1826 to 492,000 in 1873; but since then it has again increased, and in 1901 numbered about 2,900,000.

Cashmere Goat. [GOAT.]

Casimir, the name or title of many Polish princes. Casimir I., in 1041, made Christianity the prevailing religion of Poland, and Casimir III.—called the Great (1333–1370)—did much for his country. He founded a university, schools, and hospitals, and showed such regard for the lower classes of his subjects as won for him the title of King of the Peasants. He also greatly befriended the Jewish race out of love for his Jewish mistress. He drove back the Tartars who were threatening his kingdom, and added the Little and Red Russias to his territory.

Casino (from Ital. *casa*, a hut) is a name generally applied to a building in which music and dancing, and other entertainments, are provided for the public who choose to pay a price for entering.

Caspian Sea, THE. The largest inland sea of the world, lying partly in Europe and partly in Asia, and extending from lat. 36° 40′ to 47° 20′ N.—a length of 740 miles—and from long. 46° 50′ to 55° 10′ E.: having an average breadth at the centre of 210 miles, and at its north extremity, where it throws out an arm to the E., a breadth of 430 miles, and has an area of 180,000 square miles. The area of the Caspian must have been, at a not far distant geological period, of much greater extent than now, and it was probably connected with the Black Sea on the W. and the Sea of Aral on the E. Its present level is 84 ft. beneath that of the Black Sea, and 248 ft. below that of the Sea of Aral. The Caspian has three natural basins, a northern and shallow one, which receives the large rivers Volga and Ural, and partly owing to the great quantity of alluvium brought down by them, and partly owing to the great evaporation that takes place, is in process of gradual transformation into salt marsh, in spite of the great volume of water brought down by those rivers. The middle and deep portion of the sea, and the saltest, extends to the Peninsula of Apsheron, where the ridge of the Caucasus enters the sea, and passes as a submarine ridge to the Balkan Peninsula on the eastern side. On the E. side, a bold coast-line formed by the edge of a plateau lying between the Caspian and the Aral recedes, and a large shallow bay is formed, which is terminated by the Balkan Mountains on the south, and is almost cut off from the main sea. This middle basin varies from a depth of 400 fathoms in the centre to one of 30 fathoms upon the ridge above-mentioned. The middle basin receives the Terek, and some smaller rivers which flow through the plain that lies between the Caucasus and the Caspian. The southern basin extends from Cape Apsheron on the W., and follows the shore-line made by the Elburz Mountains round the S. extremity of the sea as far as Astrabad—a Persian town in the S.E. This part receives the Kur, which drains the southern slopes of the Caucasus, and receives the Aras (the ancient Araxes) in its lower course. This river Aras is the boundary between Russian and Persian territory. In the gap that lies between the point where the Elburz range trends from the sea, and the point where the Balkan Mountains touch the sea, the Attrek flows in, and the ancient course of the Oxus is plainly marked as having once led to the Caspian and not as now to the Aral. Another remarkable depression seems to show a former communication between the Caspian and a now dried-up bay of the Aral. The northern shores of the Caspian fade almost imperceptibly into the slope of the steppes. A system of canals between the feeders of the Volga and those of the Duna and Lake Ladoga unites the Caspian with the Baltic. There is a great range of temperature in the Caspian, and in winter the northern, and sometimes part of the middle basin are frozen over. Though there are no tides in the Caspian, it is subject to violent storms of wind which render navigation dangerous. The admixture of sea and river fish in the Caspian is remarkable. Among the former there are seals and herrings and salmon, and the sturgeon with its congeners—so valuable as an article of commerce both for their flesh, and for the caviare and isinglass they supply—is an estuary fish. Naphtha and petroleum abound on the shores; and the Peninsula of Apsheron, with its town of Baku, is saturated with naphtha. The Russians possess three sides of the sea, and have a fleet upon it, and a line of steam packets; and the towns of Astrakhan, Derbend, Baku, and Krasnovodsk, from the last of which a railway runs to Merv and Samarcand, while from Baku a railway runs to the Black Sea. The southern shore is Persian.

Cass, LEWIS (1782–1866), an American general and statesman, born at Exeter in New Hampshire, was bred to the bar, and became a member of the Ohio legislature. He served in the war (1812–1814) with England, and rose to the rank of general; as Governor of Michigan—a post which he held for eighteen years—he was much occupied with the affairs of the Indians, who were the chief inhabitants of the region, and besides gaining land from them for the State, and amassing wealth for himself, he did much civilising and exploring work. In 1831 he was War Secretary to General Jackson, and in 1836

he was appointed plenipotentiary to France, and records his high opinion of Louis Philippe in a work upon *France: Its King, Court, and Government*, published 1840. He was twice an unsuccessful candidate for the presidency, and held office as War Secretary under President Buchanan, but retired in 1860 over the question of North and South. Although an advocate of the slave trade, he was in favour of maintaining unity. His Indian experiences he embodied in a *History of the Indians*, published in 1823.

Cassagnac, ADOLPHE GRANIER DE (1806–1880), a French journalist, born in the country, came to Paris in 1832, and was a writer in several journals. His style gained for him fame, and embroiled him in duels and lawsuits. He was an Orleanist till 1848, and after that a supporter of the empire, and representative of his department from 1852 to 1870. After founding many papers, he became editor-in-chief, after the establishment of the republic, of *Le Pays*. He also wrote some romances.

Cassagnac, PAUL ADOLPHE MARIE (born 1843), son of the above, and by his mother's side of Creole extraction, also adopted the profession of journalist, and joined his father on *Le Pays* in 1866. He was taken prisoner at Sedan, and was for a time kept upon German territory, but in 1872 he returned to Paris, and again joined *Le Pays* as an ardent Imperialist, but probably did the cause more harm than good. He fought many duels, and caused many scenes in the Chamber. He died in 1904.

Cassander (354–297 B.C.), King of Macedonia. Being passed over in the succession by his father Antipater, he allied himself with Antigonus and Ptolemy, and after gaining most of the Greek cities, including Athens, he invaded Macedonia, and by the year 306 had made himself King. His wife was Thessalonica, the sister of Alexander, and in her honour he founded the city, which bore her name. In his later life he joined Lysimachus, Ptolemy, and Seleucus against Antigonus, who was killed at the battle of Ipsus (301), and he left his crown to his son Philip.

Cassandra, in Greek mythology, a daughter of Priam and Hecuba, who had the gift of prophecy bestowed upon her by Apollo, who, however, with the generosity which often characterised the gods, neutralised his gift by accompanying it with the condition that she should never be believed. Thus, her prophecy of the downfall of Troy had no further effect than causing her to be looked on as "the wild Cassandra," as Œnone calls her in Tennyson's poem. At the sack of the city she was dragged from Athena's temple by Ajax Oileus, and finally fell to the share of Agamemnon, and was murdered by Clytemnestra.

Cassation, a French law word signifying the reversal of a judicial sentence. It is derived from *cassare*, which, in the barbarous Latin of the lower ages, was synonymous with *irritum reddere*, to annul. The French Tribunal de Cassation received its full organisation under Napoleon, and has ever since continued under the title of *Cour de Cassation*. It is the highest court in France and receives appeals from all other courts. It consists of a president, 3 vice-presidents, and 49 ordinary judges or counsellors, a procureur-general or public prosecutor, 6 substitutes (known as advocates general), and several inferior officers. The judges are appointed by the President of the Republic, and their appointments are irrevocable. The court is divided into 3 sections: 1, The *Section des Requêtes*, which decides whether the petitions or appeals are to be received; 2, the *Section de Cassation Civile*, which deals with civil cases; 3, the *Section de Cassation Criminelle*, which deals with criminal cases. These several sections do not decide upon the main question, but only on the competency of the other courts, and the legality of the forms and principles of law by which the cases have been already tried. If the law is found to have been violated, the sentence of the inferior court is annulled, and the case sent to be tried by another court. If this second court decides the case in the same manner as the first, and a petition against the decision is again laid before the Court of Cassation, then the three sections unite in order to examine the case afresh, and if they find reason to pass a second reversal, the case is sent to be tried before another court. Should this third court decide in the same way as the other courts, and a petition against the decision be again presented to the Court of Cassation, the court requests a final explanation of the law on the point at issue from the legislature. The court also possesses (when presided over by the Minister of Justice) the right of discipline and censure over all judges for grave offences not specially provided for by the law.

The institution of the Court of Cassation has proved highly beneficial to France; it has acted as a watchful guardian of the laws; it has afforded protection to its citizens against arbitrary acts, and the misjudgments or misconstructions of the other courts. Placed by the nature of its office out of the immediate influence of political partisanship, it has maintained its high character for strict impartiality throughout all the changes of government and administration. Many of the most distinguished jurists of France have been among its members.

Cassava, the starch obtained from the large fleshy roots of the euphorbiaceous *Manihot utilissima*, the bitter cassava, and *M. Aipi*, the sweet cassava—both natives of tropical America, where they are largely cultivated. Both are shrubby plants, the former with yellow poisonous roots and seven-lobed leaves, the latter with reddish wholesome roots and five-lobed leaves. The coarsely-grated roots are baked into *cassava cakes*, from which the intoxicating drink *piwarrie* is prepared by mastication, fermentation, and boiling. The juice of the poisonous kind is rendered harmless by boiling, and is then the delicious sauce known as *cassareep*. If allowed to settle, it deposits a large quantity of starch, known as *Brazilian arrowroot* when simply sun-dried, or as *tapioca* when partly converted into dextrine by roasting on hot plates.

About 83 per cent. of tapioca is pure starch. The poison of the bitter cassava, which is dissipated by heat, contains prussic acid.

Cassel, a partly-walled Prussian town, once the capital of the electorate of Hesse Cassel, now chief town of the province of Hesse Cassel, on the river Fulda, a bridge over which connects the old town with the lower new town. The streets of the new town are some of the finest in Germany, and the Friedrichs Platz is the largest square of Germany. Fronting this square are the residence of the former electors, and the Museum, which contains a library of 100,000 volumes, and among other curiosities a fine collection of clocks and watches, including the "Nuremberg Egg." There is also a fine collection of paintings at Bellevue Castle. In the neighbourhood of Cassel is the summer palace of Wilhelmshöhe, where Napoleon resided after the defeat of Sedan. In the park is a colossal figure 31 ft. high of the Farnese Hercules. Baron Bunsen was a native of Cassel, and Spohr conducted the orchestra at the Opera House. The manufactures and trade are considerable, and there are many breweries.

Cassell, JOHN (1817–1865), founder of the publishing firm widely known as Cassell, Petter, and Galpin, and now as Cassell and Co. The difficulties that attended his own education set him to trying to make it easier for other people, and he in 1850 issued *The Working Man's Friend*, and in 1852 *The Popular Educator*, which has been a boon to many a man and boy who were trying to educate themselves. In 1859 he entered into partnership with Messrs. Petter and Galpin, since which time the publications issued by the firm of every variety of interest are legion.

Cassia, a large genus of leguminous plants of various sizes, many of which are in cultivation, having handsome pinnate leaves and showy yellow flowers which are not papilionaceous. Three of the ten stamens are long, four short, and three sterile, and the anthers open by pores. Whatever their shape, the leaflets are always oblique at the base, so that adulteration is readily detected. The leaflets (with which the pods are often mixed) of several species are the well-known cathartic drug, senna (q.v.). The chief varieties are, Alexandrian or Nubian, Aleppo, Bombay or Tinnevelly, and American senna, the latter being the produce of *C. marilandica*. The seeds of *C. occidentalis*, a widely-distributed species, are known as Negro coffee, being used as a substitute for coffee, and are found valuable as a febrifuge. *C. fistula* has been separated as the genus *Cathartocarpus* from the peculiar structure of its fruit. This is a black, woody, cylindrical pod, one to two feet long, marked by three longitudinal furrows, and divided internally into numerous one-seeded compartments by transverse partitions.

Cassianus, JOANNES EREMITA (or Massiliensis) (360–448), a celebrated hermit, and one of the earliest founders of monastic institutions in Western Europe. After spending the early part of his life in the monastery of Bethlehem, he went to Egypt with his friend Germanus, and stayed for some years among the desert ascetics of the Nile. St. Chrysostom ordained him at Constantinople in 403, and he then went to Marseilles, where he founded two monasteries. In theology he was opposed to the doctrine of man's worthlessness as held by St. Augustine, and not going so far as Pelagius, has been called a semi-Pelagian. Of his works, that *De Institutione Cœnobiorum* and *The Incarnation* are the most notable.

Cassican, any bird of the South American genus *Cassicus*, of the family *Icteridæ*, and characterised by the naked nostrils, the space between which is expanded into a frontal shield.

Cassiduloida, one of the orders of Sea Urchins (Echinoidea), including those forms which possess a "floscelle," and which are not provided with jaws. A floscelle consists in the development of a star-shaped ornamentation around the mouth, by the ambulacra becoming expanded and depressed, and the intervening areas being raised into ridges. Living species are mainly tropical, and many are deep sea. Among British fossils of this order is the Jupiter's Cap (*Galerites albogalerus*), one of the best known chalk fossils, and the flat Cake Urchin (*Clypeus sinuatus*), common in the inferior oolite rocks of the Cotteswolds.

Cassini. The name of a family of astronomers which furnished for four generations directors to the observatory of Paris.

1. C. GIOVANNI DOMENICO (1625–1712), born near Nice, was educated by the Jesuits of Genoa. His studies in astrology led him on to that of astronomy, and in 1650 he was professor of astronomy at the University of Bologna. He made observations upon the comet of 1652, and formed a theory of comets. He showed himself a man of general science, and also displayed great practical abilities, so that it was only upon a promise to return that Pope Clement IX. allowed him to start for France, where he was offered the post of director of the Paris observatory. He became naturalised, and married a French lady, and in 1671 began the series of discoveries that made him the most renowned astronomer of Europe.

2. C. JACQUES (1677–1756) succeeded his father as director, and like him was an original observer, but had little knowledge of contemporary thought, though he was acquainted with Newton.

3. CÆSAR (1714–1784), son of the above-mentioned Jacques, succeeded his father as director, and also published a topographical map of France.

C. JACQUES DOMENIQUE (1748–1845), son of Cæsar C. The fourth and last of the line of directors. He was the most philosophical of the family, and in 1769 undertook a voyage to test Le Roy's chronometers, and also took part in 1779 in the work of connecting the Paris and Greenwich observatories by means of a chain of triangles. A dispute with the National Assembly in 1793 caused him to be imprisoned for seven months, after which he abandoned astronomy and retired into private life.

Cassiodorus, MAGNUS AURELIUS, an Italian

statesman and historian (468–568), who was secretary to the King Theodoric, and after his death the chief minister of Queen Amalasontha. He seems to have had great influence with Theodoric, and to have dictated much of his policy. Cassiodorus wrote a history of the Goths, which, however, only exists now as an epitome, and he left twelve Books of Letters which, of no great merit in themselves, are yet of great value for the light they throw upon the history of the time, and the general condition and management of the kingdom. The latter part of Cassiodorus's life was spent in his native Calabria.

Cassiopeia, or the Lady in her Chair, as it is sometimes called, is a constellation in the northern hemisphere, near the North Pole, and consists of five stars forming a W-shaped group. A new star was discovered in the constellation by Tycho Brahe in 1572, which exceeded all the fixed stars in brilliance, but gradually faded, and disappeared in 1574.

Cassiquiare, a river of Venezuela in South America, which forms a bifurcation of the Orinoco with the Rio Negro to the south, which it joins after a course of 130 miles, and forms a water communication between the Amazon and Orinoco with their branches, that is to say from the interior of Brazil to Venezuela.

Cassiterides, or TIN ISLANDS, were once supposed to be N.W. of Spain, and so marked in Ptolemy's map, then generally considered to be the Scilly Islands or Cornwall, and now again thought by some to be some islands in Vigo Bay off the Spanish coast. Wherever the islands were, the Phœnicians traded with them for tin, but the likeness of the Greek word for tin to a Sanscrit word has led some to think that the Phœnicians brought both metal and name from India.

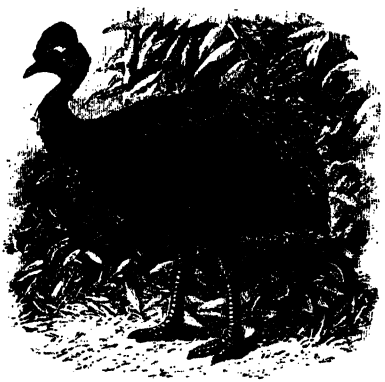
Cassiterite, or tinstone, is the principal ore of tin, and consists of the dioxide SnO_2. It occurs largely in Cornwall, Saxony, and India. It is hard and brittle, and has sp. gr. 6 to 7. It crystallises in the tetragonal system, generally forming prisms terminated by pyramids.

Cassius, CAIUS, one of the conspirators against Julius Cæsar, and one of his assassins. After a successful career as a soldier in the Parthian war, under Crassus, he returned to Rome in 49 B.C., and became tribune of the people. In the dispute between Cæsar and Pompey he sided with the latter, but after Pharsalia he surrendered to Cæsar, who pardoned and befriended him. In spite of this he appears to have been the chief mover in the conspiracy against Cæsar, possibly through aristocratic prejudice, or from meanness of nature. After Cæsar's death Cassius went with Brutus to Macedonia and Syria, and was with him at the battle of Philippi, where they were attacked by Antony and Octavianus. The division under Cassius was defeated, and he ordered his freedman to kill him, thus dying as a second-hand suicide.

Cassivelaunus, CASSIBELAUNUS, CASSIBELAN or CASWALLON, the name according to Cæsar (*Bell. Gal.* v. 11, *seq.*) of the British chief of the Cassi, a tribe settled north of the Thames in and about Hertfordshire, with St. Albans (Verulamium) as their capital. His military capacities caused him to be put at the head of a confederacy of Britons for the purpose of resisting Cæsar's invasion in 54 B.C. He seems to have fought with gallantry and skill, but he was no match for Roman discipline, and possibly his nominal allies, the Trinobantes, played him false. Verulamium was stormed, and Cassivelaunus was forced to submit.

Cassock, a loose coat or outer robe, generally worn in former times. The name is now restricted to the outer robe of a priest, or ecclesiastic, or other person employed in the service of the church. It differs in form and appearance from the *soutane*, whose wearing is restricted to persons in Orders.

Cassowary, any bird of the Ratite genus *Casuarius* (with nine species, eight of which are



CASSOWARY (*Casuarius galeatus*).

found in the islands from Ceram to New Britain, and one in North Australia), forming with the emu the family *Casuariidæ*. These birds are closely allied to the Rhea (q.v.), and are most abundant in the Papuan Islands. The cassowary stands about five feet high, and resembles the ostrich in general appearance, though the neck is much shorter. The head bears a horny casque or helmet, and, like the neck, is naked. Pendent wattles are present, generally brilliantly coloured, as is the skin to which they are attached. The wings are rudimentary, each with five quills; the aftershaft of the dusky body-feathers is very long, so that these appear to be double, and the general character of the plumage is hair-like. The legs are very muscular, each with three toes, the inner one of which is armed with a long sharp claw. These birds—which usually live in pairs in wooded country—run and leap well, and, when attacked, kick violently forward, or use their short strong wings as weapons of defence. The eggs are few in number, green in colour, and the male takes part in incubation.

Castalia, a stream issuing from a cleft in the

Phædriades, the cliffs at the base of Mount Parnassus, at Delphi in Greece. It was venerated as the haunt of Apollo and the Muses, and so came to be looked upon as a source of poetic inspiration. "Castalius" is a classical epithet for anything connected with Apollo, and the Muses are styled "Castalides." In modern times the spring bears the name of St. John.

Castanets, from the Spanish word for chestnut, are two hollowed pieces of wood or ivory, shaped like the halves of a chestnut, and joined by a band or cord which passes over the thumb, the two halves falling into the hollow of the hand. They are used to make a rattling accompaniment to music or dancing, and serve to mark the rhythm. The Moors are said to have introduced them into Spain; and the krotalon of the Greeks served a similar purpose. Nature has provided the rattlesnake with castanets, which however differ in shape from those used in Spain.

Castanos, Francisco Xavier de, Duke of Baylen, was born about 1755, probably at Madrid, and received a military education in Germany. He was driven out of Spain by Godoy, but on the fall of the favourite he returned, and in 1808 gained a remarkable success at Baylen over the French, commanded by Dupont. He served with distinction during the rest of the war, displaying much courage and skill at Vittoria in 1813. He was captain-general in 1823, and councillor of state three years later, following a moderate policy. In 1843, after Espartero's fall, he was made guardian of Queen Isabella. He lived until 1852.

Caste, the name generally employed to designate the divisions of the Hindoo religious bodies in India, or rather a division partly religious and partly social. The system of caste prevailed in Egypt and in Persia, but it is in India that it has been most fully developed. The theory of its origin is that the Aryan race on arriving in India looked down upon the aboriginal races whom they stigmatised as *once-born*, while they called themselves *twice-born*. The twice-born themselves were divided into the priestly or Brahman caste, the Kshatryas or military caste, and the Vaisyas or agricultural class. The aboriginals were called Sudras, and in the south of India, Pariahs. Representing the subject allegorically they held that the castes all sprang from the primitive man, the Brahmans issuing from his mouth, the Kshatryas from his arms, the Vaisyas from his thighs, and the Sudras from his feet. Readers of Arthur Helps's *Realmah* will remember Realmah's three wives, the high-caste wife, the Varna or middle-class wife, and the Ainah or slave wife. Besides these castes there are mixed castes, of which the Chandâla being the offspring of a Brahman and a Sudra. The Pariahs of South India are probably a mixed caste also. The system is now much modified since the free intercourse of the natives with Europeans and with civilised modern life, and the Brahman is the only one of the old castes left. But the system has spread to trades, guilds, and callings, and even the servants have fallen into the custom of making their special work a kind of caste, and refusing to do anything but their own special task. But a loss of caste in any way, except that of changing from Brahman to Christian, is easily atoned for, and a money payment and slight ceremony restore the offender to full communion. It may be said now to exhibit itself rather as a habit of mind than as a principle. The tendency to caste exhibits itself continually in the attitude of a conquering race to the race it has subdued; witness the Normans and Saxons, the American white citizen and the negro, or even where there is great social inequality, real or supposed, as in England and most other countries.

Castelar-y-Rissol, Emilio, born in 1832 of a middle-class Spanish family, and brought up as a Liberal Catholic, won literary distinction very early by a novel, *Ernesto*, and by many articles in the Madrid press. He also established a great reputation for eloquence. Elected professor of history and philosophy in the University, and editing at the same time the *Democracia*, he exercised considerable political influence, and in 1866, being mixed up in the abortive revolutionary movement, he was condemned to death, but managed to escape to France. There he wrote some interesting non-political sketches, *Ricuerdos de Italia* being the most graphic. Returning to Spain in 1868 he advocated a federal republic, actively opposed the government of Amadeo, and forced on his resignation. In the republic that followed he played a leading part, but his Liberal Catholicism was acceptable neither to the Socialists nor to the Ultramontanes. In 1873 he was appointed dictator, but even with that amount of power he failed to make head against the Reds in the south, and Don Carlos in the north. He resigned next year and again took refuge in France, where he published among other works a *History of the Republican Movement in Europe*. Alfonso permitted his return in 1876, and he limited himself to verbal protests against the monarchy, nor did he attempt any revolt against the dynasty when the king died in 1885. He died in 1899.

Castellamare, or Castel-a-Mare, a port on the coast of Italy, 15 miles S.E. of Naples, situated at the foot of Monte Sant' Angelo (Mons Gaurus). It commands a fine view of the famous bay, occupying part of the site of the ancient Stabiæ, the scene of Pliny's death at the time of the great eruption of Vesuvius in 79 A.D. The castle here was built by Frederick II. and enlarged by Charles I. of Anjou, and Alfonso I. of Aragon. The royal palace of Quisisana owes its foundation to Charles II. of Anjou, and its restoration to Ferdinand I. There are also many churches and convents, a cathedral, the seat of a bishopric, an arsenal and dockyard, barracks, etc. Ship-building is still the chief industry, though vessels of war are no longer constructed here. Linen, silk, and cotton goods are manufactured. In the neighbourhood are many handsome country houses and villas.

Castellio, or Castelli, Benedetto, born at Brescia in 1577, entered a monastic order, but was a scientific follower of Galileo. He held a professorship of mathematics at Pisa, and afterwards at the

Sapienza College in Rome, and he invented, at the suggestion of Pope Urban VIII., a system for measuring the volume of running water. He died in 1644.

Castellio, or CASTALIO, SEBASTIAN, was born in Dauphiné about 1515, his family name being Chateillon. Through Calvin's influence he got a professorship at Geneva, but as he rejected his master's theory of reprobation he had to resign, and settled at Basle. There he translated the Bible into Latin, and wrote several theological works, dying in 1563.

Castellon de la Plana, one of the five provinces into which the realm of Valencia, Spain, is now divided. Mountainous to the N.W., it contains fertile valleys to the S. and E., and derives its name from a great plain artificially irrigated by the waters of the Migares. The capital bearing the same name stands five miles from the coast, and 40 miles N.E. of Valencia, and is an ancient walled town with several convents and churches, in which may be seen masterpieces of the local painter, Ribalta. The town-hall has a tower 260 feet in height. There is a brisk trade in sail-cloth, linen, paper, earthenware, and fire-arms.

Castelvetrano (anc. *Entella*), a town of Sicily 29 miles S.E. of Trapani, the capital of a canton. It stands in a fertile plain which produces oil and excellent wine. There is an old castle and several monastic buildings. Cloth, silk, cotton, with coral and alabaster ornaments, are made here.

Castiglione, BALDASSARE, was born at Casatico, near Mantua, in 1478, and having been educated at Milan, entered the service of Ludovico Sforza, afterwards attaching himself to the court of the Duke of Urbino, who sent him in 1506 as ambassador to England. He was then envoy to Leo X., who made him generalissimo of the Papal army. Clement VII. sent him in 1525 as envoy to Charles V. at Madrid. He settled in Spain as Bishop of Avila, and he was suspected of having betrayed his master to the emperor. If so, he was a consummate hypocrite, for his famous work, *Il Cortegiano* ("The Courtier"), nicknamed by the Italians *Il Libro d'Oro*, is one of the noblest sketches of the character of a gentleman, and is, moreover, a model of Italian prose style. He also composed neat poems in Italian and Latin, and his letters are elegant and witty. He died at Toledo in 1529.

Castiglione, LAGO DE, a lagoon 10 miles long and from one to three miles broad, in the province of Siena, Italy. It communicates by a canal with the Mediterranean, and the town of CASTIGLIONE DELLA PESCAJA is on its shore. Many other towns and villages of Italy bear the name Castiglione.

Castiglione Fioretino, eight miles S. of Arezzo by rail, is an important centre of silk cultivation.

Castiglione della Stiviere, a fortified town in the province of Brescia, Italy, 20 miles N.E. of Mantua. In 1796 Marshal Angereau here inflicted a severe defeat on the Austrians, and received subsequently from Napoleon the title of Duc de Castiglione. The battle-field of Solferino (1859) is also in the neighbourhood.

Castile (Spanish, *Castilla*), an ancient kingdom occupying the centre of Spain, its name being derived from the forts (castillos) that protected its frontiers against the Moors. It extended about 300 miles from N. to S., and 160 miles from E. to W., and had an area of 45,000 square miles. The northern portion, which was first wrested from the Moors, was called Old Castile, the southern half, conquered later, being known as New Castile. The former is bounded by the Bay of Biscay on the N., by Leon and Asturias on the W., and by Biscay, Alava, Navarre, and Aragon on the N.W. and W. Its area of 25,409 square miles is divided into the provinces of Burgos, Logroño, Santander, Soria, Segovia, Avila, Palencia, and Valladolid. Most of this tract consists of a lofty, bare plateau, flanked by the Cantabrian range on the N., and the Sierra Guadarama on the S. The climate is subject to extremes of heat and cold, but wheat grows well under proper cultivation; wine, oil, and fruits are also produced, and there is plenty of good pasturage. Timber is rare, but stunted oak-groves cover the lower ranges of the hills. The only large rivers are the Douro and Ebro. The mountains yield various minerals, but want of enterprise and of roads checks mining operations. The manufactures are inconsiderable, cloth being the chief.

New Castile is bounded on the S. by La Mancha, on the W. by Estramadura, and on the E. by Aragon and Valencia. It has an area of 20,178 square miles, and is divided into four provinces, Madrid, Toledo, Guadalajara, and Cuenca. Occupying a table-land that stretches from the Sierra Guadarama to the Sierra Morena, it has much the same climate as the northern province, but the heat in summer is more intense, and the broken nature of the ground towards the S. offers greater varieties of soil and temperature. Grain, oil, and wine, are produced abundantly, the Val-de-Penas vineyards being most highly esteemed. Saffron, madder, hemp, and fruit are successfully cultivated. The Sierra Morena is rich in marble and minerals, and the silver mines of Almaden have been celebrated for centuries. Cattle and horses are raised in great numbers, and merino wool is a valuable export. Manufacturing industries are at a low ebb. The chief rivers are the Tagus, Guadiana, Guadalquivir, Segura and Jucar, but water is everywhere scarce.

Castile was erected into a kingdom in the eleventh century under Sancho the Great of Navarre, who gave it to his son Ferdinand I. This latter added by conquest Leon, Asturias, and Galicia to his domains, and New Castile was also acquired. Ferdinand III. (1230) drove the Moors out of Estramadura and Andalusia, but the fortunes of the monarchy were variable until Isabella, sister and successor of Henry IV., married Ferdinand of Aragon (1474). Granada was soon afterwards annexed, the Moorish domination came to an end, and the kingdom of Castile merged into that of Spain.

Casting, the process of making objects in metal by pouring it when molten into moulds of the requisite shape. These moulds are made by means of wood or metal *patterns* of the required objects, and are generally lined with dry sand, green sand, or loam. Iron, steel, brass, and other metals are now cast very extensively.

Casting Vote, the vote given by the president of an assembly when the votes upon the two sides of a question are equally balanced. Some derive the name from the fact that this vote *casts* the decisive weight into the one scale or the other. The Speaker of the House of Commons, and the chairmen of Select Committees, Ways and Means, and Committee of the whole House, vote only when the voting is equal. In some assemblies the chairman has a casting-vote besides his ordinary vote.

Cast Iron. [IRON.]

Castle (from Latin *castellum*, a fort), in a wide sense, signifies a fortified dwelling. Some of the earliest examples are the lake dwellings, and the many hill-forts which were in use among prehistoric peoples. The Musk-rat's castle in Fenimore Cooper's *Deerslayer* was a more modern example. The castle as now generally known among us, generally in the form of ruins, is the latest and final stage of the fortified dwelling, which passed out of use with the invention of gunpowder and the advance of civilisation. The germ of the castle seems to have been the keep, built on a mound, and surrounded by a ditch and palisade. This keep, which had the general assembly hall upon the ground floor, the family apartments on the second floor, and the garrison accommodation mostly in the upper part handy to the battlements, gradually became too restricted for the tastes of the day, and the more elaborate castle had in addition outer walls with towers at the angles, and containing more extensive and comfortable buildings; the towers each forming a stronghold, and the keep providing a final refuge in case all the rest of the castle were taken. Drawbridges, which could be easily raised from within, and doorways defended by strong doors and single or double portcullises, and having over them apertures for pouring red-hot lead and other unpleasant things upon the assailants, increased the security of the castle. On the principle of an animal who has two entrances to his retreat, there was generally a postern door, which communicated with the outside, and was kept, when possible, secret. Many castles owed their fall to the discovery or betrayal of this secret. There are some fine specimens of castles in England, from Arundel downwards. The castle of Bouillon, in South Belgium, is a fine specimen, with its double moat, of the latest (17th century) condition of castle fortification. The term was also used in chess; at sea, where it remains in the term *forecastle;* while most of us have built castles in Spain, or in the air. Examples of the castle frequently occur in heraldry both as a charge upon the escutcheon and as the whole or part of a crest. Unless particularly described as otherwise, it is understood to be a gate or portway in a battlemented wall between two towers. When the cement is of a different tincture to the stones, the castle is said to be "masoned" of that colour. If the portway is defended by a portcullis, it must be specially mentioned, and when the field is visible through the windows and ports, the term "voided of the field" is employed. When these, however, differ in colour both from the castle itself and from the field, they are supposed to be closed, and they must be particularly blazoned. A castle with four towers, or, as it is more generally known, "a square tower," is occasionally met with, and is always drawn in perspective. If other towers, which are sometimes termed "castellets," rise from the battlements, their number must be stated, as also particulars of any domes, cupolas, and banners which occur.

Castleford, a town in the E. division of the West Riding of Yorkshire, 10 miles S.E. of Leeds, on the river Aire, with a station on the Great Northern and North-Eastern railways. It is an ancient place, being identified with Legeolium, a Roman station on the Ermine Street between Doncaster and Tadcaster. Large numbers of glass bottles are made here. Pop. (1901), 17,382.

Castlereagh, a small market town in the barony of Castlereagh, co. Roscommon, Ireland. It is situated on the river Suck, 17 miles N.W. of Roscommon, and 115 miles from Dublin by rail. A considerable trade is carried on in agricultural produce.

Castletown, or CASTLE RUSHIN (Manx, *Bully Cashtel*), until the middle of the 19th century the capital of the Isle of Man, and seat of government, is situated on the river Silverburn, where it flows into Castletown Bay, 11 miles S.W. of Douglas. It is well built and clean, possessing a safe harbour. The old stronghold, Castle Rushin, was built by Guthred the Dane in 960, and now serves for a prison and municipal offices. The House of Keys stands near it, and there are a town-hall, market-house, and other public buildings. King William's College is about two miles distant from the town.

Castor and Pollux, or DIOSCURI, in Greek mythology, the twin sons of Zeus (Jupiter) by Leda, though Homer asserts that they were the legitimate children of Tyndareus, and therefore brothers of Helen. They invaded Attica to rescue their sister from Theseus, joined Jason in the Argonautic expedition, took part in hunting the Calydonian boar, and finally engaged in combat with the sons of Aphareus, when Castor, being mortal, was slain. Pollux thereupon begged Zeus to be allowed to die with him, and it was arranged that they should take it in turns to visit Hades day and day about. Other legends declare that for their brotherly love they were promoted to stellar dignity. In any case they became worshipped as gods, Castor being the tutelary deity of horsemen, and Pollux of boxers, whilst both took travellers

under their special protection. They soon found a place in Italian mythology, and were believed to have fought for the Commonwealth at the battle of Lake Regillus. Their festival was celebrated with great pomp on the ides of April.

Castoreum (from Gk. *castor*, beaver), the name given to a secretion supplied by both male and female beavers. This secretion—brown, and having a peculiar odour—is contained in two glands or sacs, and among the Hudson Bay traders 10 pairs of these sacs were equal in value to one skin. Formerly castoreum was much used in medicine, and Bacon in his *Essay of Friendship* recommends "castoreum for the brain." The substance is still used as a perfume.

Castoridæ, a family of rodents, consisting of a single living species, *Castor fiber*, the Beaver (q.v.).

Castor Oil, the acrid, mildly-purgative, non-drying oil obtained from the seeds of the euphorbiaceous plant, *Ricinus communis*. This plant is a native of India, but is now much cultivated in the Mediterranean region, and, for ornamental purposes, even in England, where, from its glossy, palmately-lobed leaves, it is known as *Palma-Christi*. Its flowers are monœcious and apetalous; its numerous stamens polyadelphous; and its three carpels united into a prickly fruit with three one-seeded chambers. The young stems are reddish and glaucous, and the leaves seven-lobed. The seeds are oval, flattened, grey mottled with brown, with a small micropylar aril. They contain about half their own weight of oil, the most valuable medicinal kind being obtained from the smaller seeds by hydraulic pressure without heat, or "cold drawn." Though long cultivated in Europe, castor oil was only admitted to the Pharmacopœia in 1788. We import over 1,800 tons annually—two-thirds from India, and the remainder chiefly from Italy. The coarser kinds are used in soap-making, and in India as lamp oil. It is one of the best and most satisfactory of purges; dose for an adult about half-an-ounce.

Castration, the removal of the testicles from the male animal. It is a common practice to castrate certain of the domestic animals, and special names are applied to animals in which the operation has been performed. In the case of the horse the term gelding is used; in that of the bull, bullock or steer; and wether is the name given to a castrated ram.

Castrén, MATTHIAS ALEXANDER, the son of a Finnish pastor, was born at Tervola in 1813. With great perseverance he pursued his early education, and in 1830 entered the university of Helsingfors. His attention was now drawn to his native language and literature. He soon found that personal exploration was necessary in order to collect materials for generalisation, and he spent from 1838 to [illegible]ing. He translated the Finnish epic *Kalevala* into Swedish, and compiled two grammars of Samoyedic dialects. He was then sent on a linguistic journey throughout Siberia, the result of which he published in 1849. Being appointed to the chair of Finnish at Helsingfors in 1850, he was engaged upon his great Samoyedic grammar when he died, in 1853, prematurely worn out by his exertions. His valuable researches into northern languages were chiefly published after his death.

Castres, the capital of an arrondissement in the department of Tarn, France, is situated on each side of the river Agout, which is crossed by two bridges. Founded about the middle of the seventh century of our era on the site of a Roman station (*castra*), it was one of the first places to embrace Calvinism, and is still the seat of a Protestant consistory. Henry IV. of Navarre had a residence here, but in the religious wars the walls and forts were destroyed by Louis XIII. The streets are not well built, but the *Lices* form an agreeable promenade. Cassimeres, silk and cotton fabrics, soap, glue, etc., are largely manufactured, and in the neighbourhood are valuable mines of coal, iron, lead, and copper. Rapier, Dacier, and Sabatier were born here.

Castro, GUILLEM DE, born at Valencia in 1569, began life as a soldier, but forming a close friendship with Lope de Vega, took to dramatic composition. He won European reputation by his play *The Cid*, which served as a model to Corneille. He died in 1631.

Castro, INEZ DE, whose story furnishes one of the most romantic episodes of Spanish history, was born in Galicia early in the fourteenth century, being, according to some accounts, the illegitimate daughter of Don Pedro de Castro, and a noble Portuguese lady. She was brought up at the court of the Duke of Peñafiel as the companion of Costança, the duke's daughter. Costança, in 1341, married Don Pedro, the Infante of Portugal, and her friend went with her to Lisbon, when the Infante at once conceived for her an ungovernable passion, and made her his mistress. The unhappy Costança died in 1345, but it was not till 1354 that Don Pedro married Inez, and even then their union was kept so secret that no proofs of it were forthcoming. The King, Alphonso, dreading the influence of Spain in case the children of Inez should succeed to his throne, and influenced by three rivals of her brother, consented to the assassination of his son's wife. In 1357 Don Pedro came to the throne. He forthwith inflicted terrible punishment on two of the murderers, though one contrived to escape, and according to a popular legend he had the corpse of his adored Inez seated beside him on his throne to share the honours of his coronation. A magnificent monument, enclosing her remains, was erected at Alobaça, and was only destroyed in 1810 by the French soldiery.

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